ELECTRICAL REVIEW

Vol CXLVIII No. 3840 29TH JUNE, 1951

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872

The Refrigeration Industry

REFLECTIONS ON THE B.E.P.C. DISCUSSION

THE informative paper on this subject which was presented on behalf of the British Refrigeration Association to the B.E.P. Convention at Brighton last week will cause many people to readjust their ideas of the age and size of this now firmly established industry.

The salesman's persuasive urge to "try this new way" of dealing with foodstuffs is some excuse for the mistaken impression of the housewife and the retail shopkeeper that refrigeration engineering is something new, whereas the first attempts to make ice by mechanical means would appear to have followed from the experiments 196 years ago of a Scottish medical man who was a professor of chemistry in Glasgow.

Rapid Expansion

All doubt about the dimensions to which the industry has attained is also banished by the statistical records in this paper of the home and export business done in this country. Its post-war expansion has been very rapid, reflecting a truly remarkable effort on the part of the manufacturers concerned.

If growth of usage industrially and commercially has not been quite so rapid as it has been domestically, the difference may probably be accounted for by the fact that there has not been any over-abundance of food in this country during or since the war. Nevertheless the total production of equipment in this country has increased some seven times during the last fifteen years, yet refrigerators are not fitted in more than 10 per cent of the homes which are wired for electricity. The percentage is 84 in the United States.

Technical Training

There is consequently still much scope for the home trade, which is, however, not finding it easy to recruit sufficient well trained men to cope with the technical side of the business. Some easement in this respect is hoped for, now that the Area Electricity Boards are taking more interest in the subject, if support of the National College for Heating, Ventilating, Refrigeration and Fan Engineering is not left solely to the manufacturers.

It is unfortunate that this situation should now be further aggravated by the effects of power cuts imposed by the need to shed system load. The consequences, direct and indirect, of voltage reduction and frequency drop from the points of view of refrigerator operation and maintenance are seriously perturbing the trade. They can be more grave than is sometimes apparent.

The strange thing about this paper, which so usefully indicates general trends and future tendencies, is that it does not contain a word of guidance for the layman about the heat-operated automatic refrigerator, although some 23,000 equipments of this kind were exported last year. The absorption type is not so affected as the compression type by depression of voltage and/or frequency; neither do its working parts need to be made with such extreme accuracy, or have so superior a finish. The argument that a motor-driven machine consumes little more than one-quarter of the electricity absorbed by its heat-actuated counterpart would no longer be tenable if the re-design of the latter had been pursued with the same energy as has been put into the development of the former. Is it too late to set about a re-examination of the non-rotary automatic household refrigerator?

PRIVATE GENERATION

Many of the larger industrial establishments, and some of the specialized ones, find it advisable to generate their own electricity rather than purchase energy from the public mains. The growing opinion that " private " generation in such cases should be " in parallel " with the public power supply system received further support from some speakers in the B.E.P.C. discussions at Brighton. The subject is becoming important to the national economy because of the promise it holds out of assisting towards the integration of the country's power supply system. For that reason some engineers would go even further and suggest that, when appreciable processing heat is required, the Area Boards might consider the provision of both steam and electricity.

CAPITAL INVESTMENT

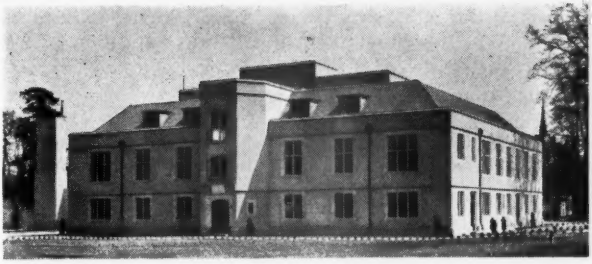
Sir Henry Self and other speakers at the Brighton Convention stressed the dire results which would follow any restrictions on capital expenditure by the electricity supply industry for its essential purposes. A special resolution on the subject was passed at last Friday's annual general meeting on the proposal of Mr. T. F. Lister (chairman of the B.E.A.M.A. Council) seconded by Mr. H. W. Bosworth. Some encouragement was contained in a statement made in the House of Commons last week by the Chancellor of the Exchequer. While he warned the House that there must not be any increase in supplies of plant and machinery for home industry, he said it was intended that investment in coal, electricity, gas, coke ovens, railways, roads and petroleum would be higher this year than last; in the first two cases investment would be substantially higher. It is to be hoped that this promise covers not only power station construction but also transmission and distribution equipment.

ANOTHER WAGE DEMAND

Parallel with the participation of the British Electricity Authority in the Power Convention, representatives of some of the Authority's employees were also meeting in Brighton. One result was the decision to demand a further increase of 1½d an hour in the wages of power station and other workers, raising the rate for skilled workers to 3s 6d an hour. The demand was accompanied by condemnation of the B.E.A. for its " miserable " treatment of wage claims. This seems to suggest that the Authority should accede to every demand without question; otherwise it can be accused, as it was, of " imitating the worst practices of private firms before nationalization." But even more than private firms the Authority has a duty to the public—its consumers, who have to foot the bill. However justified the employees' claims may be they have to be weighed with other considerations. The workers have yet to realize that they themselves are the victims of continued wage claims which help to send up the general cost of living and leave them even worse off.

RESALE PRICE MAINTENANCE

Some perturbation has been caused in trade circles by the Government's announcement of its intention to put an end by legislation to the compulsory maintenance of resale prices. In the electrical industry, for the most part, while manufacturers fix retail prices there is no method of enforcing them as there is in some other distributive trades. Moreover the margins allowed for in the prices of electrical apparatus and equipment are by no means excessive. In fact the general complaint seems to be that these margins are hardly enough to cover the after-sale service which customers expect from reputable electrical dealers. Those who cut prices therefore are either not prepared to give that service or are risking financial trouble.



The new B.B.C. research laboratory block at Kingswood Warren

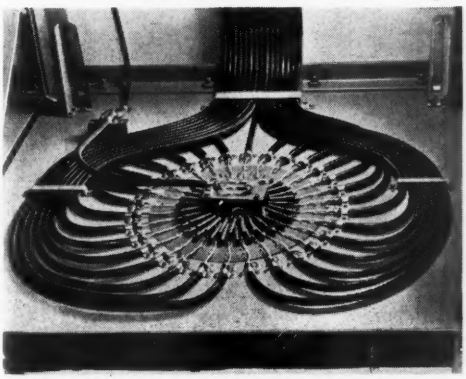
B.B.C. Research Department

"Open Day" at Banstead

IN the early days of broadcasting when the B.B.C. had its headquarters at Savoy Hill, problems arose which could not be solved by the normal operation and maintenance staff. Accordingly, a research section and a development section were formed and in 1929 these were combined to form the Research Department, which by 1934 was housed in a large building at Balham, London. The continued expansion of the Department's activities necessitated a search for larger premises and a suitable building was found at Banstead, Surrey. This building, known as Kingswood Warren, is just over 100 years old and stands in 27 acres of grounds which are available for the erection of additional buildings and outdoor experimental work. It was originally planned to build two new laboratory blocks that would allow the whole Department to be housed on one site. One has been completed and is now occupied, but owing to the present economic situation it has not been possible to begin work on the other. Nevertheless, the whole Department is now together at Kingswood Warren with the exception of the acoustics and recording sections which are still at Balham.

The Department's main function is to provide the solution to technical problems in broadcasting and it is organized in a number of sections each dealing with a particular aspect of the work. Although the work covers a very wide field it is in many respects highly specialized and a major difficulty has been that much of the equipment required cannot be obtained because the need for it has only arisen as research has progressed. Consequently, a model shop has been set up to undertake the construction of the bulk of the equipment required by the various sections. This has ranged from new pieces of test apparatus, much of it of the miniature type, to complete bays of panel mounted equipment and the first model of a new disc recording machine. There is also a drawing office and stores stocked with sufficient

This wide band transformer enables up to 60 receivers to be fed from one aerial



components for maintenance purposes and to meet the immediate demands of the model shop and the various sections.

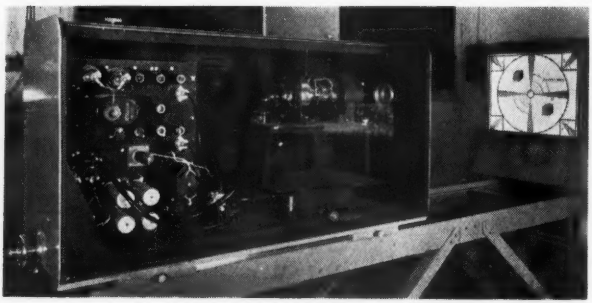
Last week the Department had an "Open Day" when, together with many distinguished scientists and research workers, we were afforded an opportunity of seeing its work at first hand. In the receiver and measurements section, for example, a great deal of work is being done on impulsive interference at high frequencies and the design of receivers to minimize its effects. Investigations are at present being made into the electrical interference caused by motor-car ignition systems and apparatus has been constructed to permit the examination of the effects of cylinder pressure. This section also keeps abreast of developments in the design of broadcasting receivers and carries out tests on typical commercial products. It designs receivers for special purposes; for example, the receivers used for the f.m./a.m. test programmes were built to the section's specifications. A comparatively small f.m. receiver has also been designed and built to show that it need not necessarily fall into the luxury price range. Other work here has involved the design of very wide band iron-cored r.f. transformers for use in connection with wide band aerial systems. These enable up to 60 receivers to be fed from a single aerial and operate on frequencies ranging from 100 kc/s to 27·5 Mc/s.

Other important work is being carried out by the electro-acoustics group which consists of three sections. First there is the acoustics section which is responsible for work connected with the design of studios. In this field a fundamental difficulty has been that what is heard by the ear often does not agree with the result of measurements. New methods of measurement and techniques have therefore been evolved in an attempt to obtain better correlation. Progress has been slow because the apparatus needed was nowhere available and had to be designed and constructed, but the major programme of construction has now been completed. Broadly speaking, the new technique is to study the response of the studio to transient sounds, using equipment which displays the result on a cathode-ray tube.

The second section is concerned with microphones, loudspeakers and audio-frequency equipment and with the general problems of sound in relation to broadcasting. It was responsible for the design of the ribbon microphone which has been used as the standard B.B.C. microphone for most purposes for about 14 years, and for a lip microphone, also of the ribbon type, designed for use close to the commentator's mouth on outside broadcasts. An improved lip microphone and small hand microphone have recently been produced and also a directional microphone for special purposes.

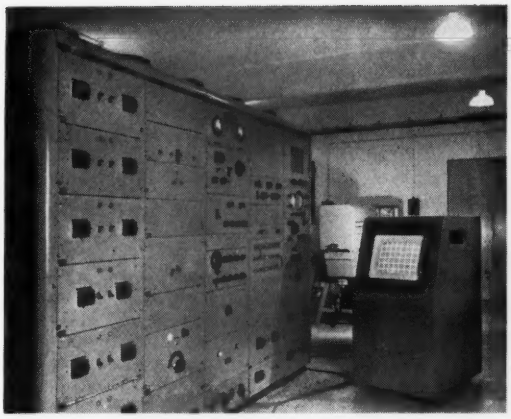
The other section in this group is responsible for research work into all systems of sound recording used in broadcasting. A thorough investigation of the disc recording process has led to the design and construction of a disc recording machine, since no equipment available commercially provided all the facilities required while meeting the standard of fidelity considered essential. The major part of the section's effort is now absorbed in investigations concerning magnetic recording. New theories have been evolved and are being tested experimentally to explain the precise mechanism of the normal recording process. The phenomenon of magnetic printing, both accidentally and intentionally, is also being studied.

Optical test bench for measuring the performance of television camera tubes



Other sections at Kingswood Warren are concerned with aerials and transmitters, field strength surveying and, of

course, television. The latter section carries out its work under three headings: camera investigations, circuit investigations and colour and optical investigations. Broadly speaking, the object is to carry out research on all aspects of television endeavour which are of importance in broadcasting. Care is taken, however, to avoid duplication by maintaining close contact with other research organizations engaged on similar problems and with research in industry. At present the main programme is a general investigation into high definition of colour systems which includes an appraisal of the most desirable standards of television in relation to the technical and economic factors involved. The section is not directly concerned with the existing 405 line television service, but when its work reveals means of exploiting more fully the possibilities of this system the appropriate information is passed on to other B.B.C. departments concerned.



This high definition television channel gives various standards of definition up to about 1,000 lines

South African News

From Our Cape Town Correspondent

TWELVE Transvaal towns and several smaller municipalities with a population of about 800,000 are affected by the Electricity Supply Commission's appeal to consumers to economize. Because of the increasing demand for electricity in the Free State goldfields, consumption in the Transvaal towns which the Commission supplies is nearing the limit at peak hours. Officials stated that the emergency would last for about two years, until the Commission's new generating stations at Vierfontein and Taaibos are ready.

The Commission has decided that supplies of power for new industries on the Reef cannot be approved unless it is satisfied that the new projects are in the national interest. In this case the Reef excludes Johannesburg, but includes Vereeniging and Vanderbijl Park. Vereeniging's supplies of power for the next two years have been limited to the maximum consumption during last winter, and since the Town Council has sold industrial sites to two major industries and several smaller companies, it is perturbed at this edict. The town clerk said that it would be extremely difficult, if not impossible, to remain within the limits imposed by the Commission.

With regard to the importation of materials for the manufacture of transformers and motors, it is reported that although local manufacturers are able to coat the sheets in the Union, they are unable to procure adequate supplies of this special type of sheet steel in uncoated form and are therefore obliged to accept the coated product from oversea suppliers. Transformers and motors are admitted duty-free from Britain and are subject to a duty of only 5 per cent *ad valorem* from other countries. The coated steel sheet, however, is dutiable at 15 per cent in respect of imports from countries signatory to the Geneva General Agreement on Tariffs and Trade and most-favoured-nation countries, imports from all other countries being subject to a duty of 20 per cent. Allied steel products such as steel sheets not worked up in any way except polished, corrugated, galvanized, coated with lead, tin or zinc are imported duty-free from Britain and are subject to a duty of only 3 per cent *ad valorem* from other countries. The South African Iron and Steel Industrial Corporation, Ltd., is as yet unable to produce such high-grade silicon steel sheet as is required by manufacturers of electric motors and transformers.

Plastics in the Electrical Industry

Methods and Applications

SINCE plastic mouldings were first used for lighting switches the progress of plastics in the electrical industry has been rapid and far-reaching until to-day there is hardly an item of electrical equipment in which such mouldings do not play a part.

This success has been due primarily to the following factors: good electrical qualities; the wide range of attractive shapes and colours which can be produced by modern manufacturing methods; the excellent " strength for weight " factor of many materials, some being virtually indestructible; and the high accuracy with which parts can be moulded and the practicability of moulding-in metal inserts, etc.

Obviously these qualities do not apply in the same degree to all materials and methods. To a certain extent every plastic job is a new one and careful selection of material and method is required, often some experiment and research being necessary before the right answer is found.

This radio cabinet is injection moulded in coloured polystyrene in a 32 oz press. As the three grilles are of the same material they can be welded into position by using hydrocarbon solvents

One of the prejudices with which the plastics industry has had to contend is embodied in the word " substitute." To-day plastics are only substitutes in the sense that they replace other materials commonly used before and in far more cases than is generally realized they do more and offer advantages in manufacturing technique and final efficiency which the previous material did not possess. However, the stigma " substitute therefore inferior " is not difficult to refute now. Often it arose from no more than a wrong choice of materials and insufficient research and experiment before manufacture.

Thermosetting and Thermoplastic

There are two main methods of producing plastic mouldings. The thermosetting method forms by pressure and heat a hard, rigid moulding which can only be altered by cutting, drilling or sawing. The thermoplastic method " shoots " molten material into a die and deals with materials which can be softened and re-moulded by the application of the right amount of heat.

From even this brief description one difference in the finished product is noticeable; the different reaction to high temperatures and contact with hot metals or liquids. This relative disadvantage of thermoplastic mouldings for certain uses is offset by many practical advantages for others. These include a high rate of production, no waste of materials, wide range of colour finishes and the mouldings of great strength which can be produced by this method.

The very large moulding is still beyond the capacity of the thermoplastic moulding plant which at present can only handle up to 48 oz. The larger thermosetting presses can deal with a far greater amount of

material (up to 35 lb) for large solid parts or cases. This material is also usually cheaper.

There is probably little to choose between the two methods in the matter of shapes. With clever tool design and mounting the possibilities are almost limitless by either method. A great deal may lie, however, in the choice and availability of material.

Regarding the electrical properties of plastics, although they are mostly insulators unless purposely modified, not all the materials available are suitable for the same type of insulation.

Plastics used for the manufacture of standard electrical fittings, such as domestic lighting and heating fittings, are generally derived from phenol formaldehyde resin. This material possesses good electrical properties and gives clean, sharp mouldings of good mechanical strength; it figures largely in the production of telephone equipment, radio cabinets and instrument cases, etc.

Urea formaldehyde also has many applications among standard electrical fittings, particularly where there is a danger of tracking, from which it gives a high degree of immunity; its resistance to heat is rather lower than that of phenol formaldehyde and it has a comparatively high water absorption characteristic, making it unsuitable for use where high dielectric strength is required.

Melamine resin is fairly new as a plastic; it has a high dielectric strength and in many ways combines the properties of urea formaldehyde with a high resistance to water absorption and to heat.

These three commonly used thermosetting plastics satisfy the majority of everyday electrical requirements and can be produced in forms which provide excellent resistance to organic solvents, mild alkalis and abrasion.

Thermoplastic materials can be produced in forms which provide outstanding electrical qualities but their susceptibility to heat makes them unsuitable for use where there is a danger of arcing.

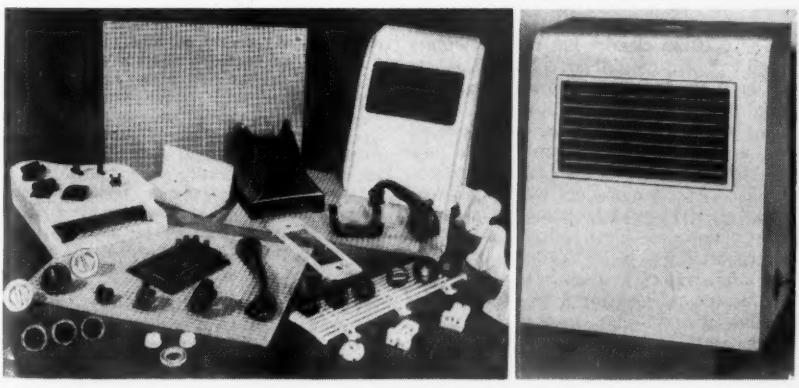
Plastics derived from polystyrene resin are characterized by a low power factor, low moisture absorption and pleasing appearance. They thus find wide applications in the radio industry especially for insulation at high frequencies.

Cellulose acetate has electrical applications where ability to withstand such assembly processes as riveting and crimping are more important than good dielectric properties and it has the advantage that it is easily cemented.

Polythene has an exceptionally low dielectric constant and a low power factor and is at the same time tough and flexible, making it particularly suitable for insulation, at radio frequencies, of wire and cable. It can be claimed that polythene played an important part in the wartime development of radar.

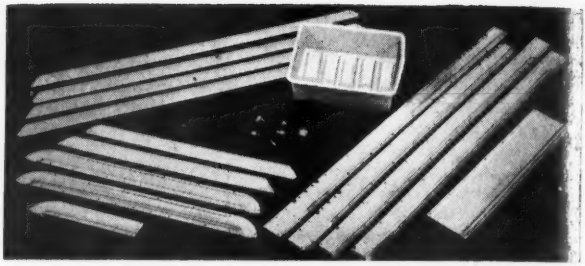
Polyvinyl resin produces a plastic with a high dielectric strength and, being tough,

Left: **These mouldings indicate the wide range of application of plastics in the electrical industry.**
Right: **The "Thermovent" heater is compression moulded in phenol**



flexible and easily extruded, is very suitable for high voltage wire and cable insulation.

Some of the more recently introduced plastics combine useful electrical qualities with quite exceptional resistance to heat, while there are plastics used in the industry which provide high light transmission as well as desirable electrical and mechanical properties.



Set of refrigerator parts—injection moulded in polystyrene including door panels, pegs and drip tray

It is perhaps in the range of colours and the scope which plastics offer the modern designer that the influence of this still new industry is most noticeable.

Lighting switches have already been mentioned and these are now nearly all plastic. In addition, lampshades (in urea) and end-caps for fluorescent fittings in injection moulded polystyrene are becoming very nearly as universal. Coloured thermoplastics are ideal for all kinds of knobs, switches and controls. Small components do not necessarily mean that the thermoplastic method must be used; a satisfactory rate of production can be reached by the thermosetting method using a multi-impression tool, although for the more decorative items the thermoplastic method offers a wider choice of colours and finishes.

The telephone owes its shape entirely to " design for plastics " and here also colour possibilities are offered for special installations. For Service use field microphones and telephones can be made from shock-proof material.

The vacuum cleaner has now become a hive of plastic mouldings. In addition to the large number of internal mouldings, handles or even the entire frame can be made of shock resisting plastic; designs are becoming more compact and the finished product lighter and easier to handle. Another product which has radically altered in appearance since the introduction of plastic handles is the electric iron.

A comparative newcomer to the plastics field is the refrigerator for which a large number of mouldings varying in size from small pegs to strips over 4ft long are being produced.

The above are only a few examples from a large number of uses for plastics in the electrical industry. The possibilities are still immense but in view of the particular qualities of materials and methods of production the manufacturer who is considering the use of plastics would be wise to obtain the best possible advice before making up his mind which material to use. Design, tool making, moulding and finishing are all inter-related and only a full study of the manufacturer's whole problem can result in a successful use of one of the many techniques referred to under the general title of " plastics."

Acknowledgment is due to E. K. Cole, Ltd., for the loan of the photographs illustrating this article.

Battery-Operated Vehicles

IN view of the increasing use of battery-operated vehicles the British Standards Institution has recently published BS 1727:1951, " Motors for Battery-operated Vehicles." It covers the classification, rating and methods of test for d.c. motors forming part of the equipment of battery-operated road vehicles, industrial trucks and tractors, but does not apply to rail vehicles. Details are given of types of motor, temperature tests, overspeed tests, high voltage tests, commutation tests, efficiency, characteristic curves and performance and type tests. The appendices include classification of insulating materials, methods of determining efficiency, terminal markings and recommended limits of temperature in service.

Copies of this publication are available from the British Standards Institution, Sales Department, 24, Victoria Street, London, S.W.1, price 3s, post free.

Electric Shock

What are the Criteria of Danger?

By Major E. H. W. BANNER, T.D., R.E.M.E.(T.A.), M.SC., M.I.E.E., M.I.MECH.E., F.INST.P., M.CONS.E.

NO one electrical factor alone determines shock danger. The most important is the energy passed through a vital part of the human body, which involves time and wattage, the latter comprising voltage and amperage. The common assumption that circuit voltage is almost the only criterion is untrue; it does largely determine current through the body, which is a major factor, but again this assumes a given resistance, which is by no means constant. The time factor is of much more importance than is generally recognized: shocks lasting for not more than a few seconds are much less likely to be fatal than those of longer duration, even though the watts may be greater in the first case.

The factors chiefly involved are: circuit voltage, resistance between contacts, the resulting current through the body, energy and duration of the discharge, part of the body involved, d.c. or a.c., burning and frequency. These will be considered separately and in combination.

What is a Safe Voltage?

There is no defined safe voltage. A regulation that not more than 250 V may be supplied for domestic uses gives the impression that this may be a safe limit, but in the U.S. 115 V is common (a factor of two) while 250 V may be considered not unduly dangerous for well-made and maintained equipment, either with frames of insulating material or earthed if of metal, without live parts exposed in bathrooms, etc., where there is a good earth connection on the other side of the user. An original supply voltage in this country was 110 V and it is generally considered to be quite safe. While fatal accidents are unusual at this voltage, they are on record. A really safe figure is probably about 30 V, and 50 V circuits with the middle point earthed may be considered quite safe for any workshop use. At 30 V the average current has been found to be about 7 mA, with limits of approximately half and double with hand-to-hand contact.

Resistance between electrodes is of considerable importance because of its wide variations. It comprises three components: the contact resistance, the skin resistance and the internal tissue resistance. The last-mentioned is the only one of approximately constant value, generally between about 100 ohms as the minimum and possibly up to 2,000 ohms as the maximum, with an average value of the order of 600 ohms. These figures seem unduly low, giving the impression that at a given applied voltage the current may be very high; but the other two resistance factors have wider ranges and are greater in value. Contact resistance can obviously vary enormously from the case of a light glancing contact to a large-area wet contact, such as a person in a bath: it involves pressure and area, whether wet or dry, etc.

Variation of Skin Resistance

Skin resistance also varies widely, not only between persons with dry skins and those with wet, but also locally due to such conditions as definitely wet by immersion in water, or temporarily wet by perspiration, etc. Some people can grasp conductors at 110 V and only determine with difficulty if the circuit is live or not. To others the same conditions may be fatal, but this is unlikely. The skin resistance has been measured for different subjects and conditions and an average of about 2,000 ohms found, with non-polarizable electrodes. The contact and skin resistances may be interdependent, such as in the extreme and opposite cases of a glancing contact with a dry skin and the grasp of a conductor with a wet hand; both the pressure, area and condition of the skin are widely different in the two cases, but the contact and the skin resistances vary similarly. Overall resistance may be as high as 0·1 megohm, but it falls considerably as

the applied voltage is increased since the body is a non-linear conductor.

Resistance has so far been assumed to be ohmic (d.c.) but with a.c. the impedance includes the reactance and the capacitance of the body may be of considerable importance at high frequencies, by reducing the current penetrating deep-seated organs, together with the skin effect.

The current in a circuit with which the body may come into contact is of little significance: that through the body alone is of consequence and, as stated, it is proportional to the applied voltage and the total body resistance at the time between the points or areas of contact. The lowest limit of current that can be felt is about 1 mA, both d.c. and a.c. In a number of tests carried out and quoted in an appendix to E.R.A. report V/T 106 of 1950 the limits were found to be 0·7 to 1·2 mA, which with an average overall resistance and good contacts was about 6 to 7 kilohms, the voltage to produce this threshold current averaging only 6·1 V. These were hand-to-hand contacts. The minimum measured to cause pain averaged 4·0 mA in these tests and (due to non-linearity) the resistance fell, and average voltage at the terminal was only 16·5 V.

Muscular Contraction

One effect of electric shock is a muscular contraction and with about 15 mA the muscles may contract involuntarily so that an increased grip on an electrode may result which cannot be released; this state is the threshold of decontrol. In the worst circumstances the minimum considered to be lethal is about 25 mA, but 70 to 100 mA is more usual. While these figures may often be exceeded safely, they give some idea of the danger limit. In cases of short-duration shocks and with current paths avoiding vital organs in the body the danger increases with current up to several amperes, beyond which it decreases.

Energy and duration of the discharge are related as regards shock danger, but not in a simple way. A shock with a given current through the body for a given time may be dangerous, whereas double the current for half the time (constant energy) may not be dangerous. A general critical time is about five seconds; longer times are more likely to be fatal than those of shorter duration, other things being equal. A safety limit of 1,200 joules (watt-seconds) has been given, but it is uncertain how f this rule applies as between voltag current and time. Another limit, but quantity instead of energy, is 100 mA f one second, if through the heart. Aga it is based on a limited number of observ tions and is not a rigid limit.

Paths through Body

The part of the body traversed by t current is obviously of consequenc generally if the head, heart, or lungs in the main current path the shock is muc more likely to be lethal. A path fro hand to hand includes both the heart an lungs, but if from foot to foot it does no The brain is in circuit when the head form one electrode. The danger to the brai is that of paralysis, directly by making th subject unable to free himself from contact or indirectly by permanent damage. The heart may be upset and cease to beat synchronously, or fibrillate; this effect is commonest with mains voltages and currents exceeding 100 mA for one second.

Experiments on animals have shown that in some cases it has been possible to restore synchronous heart beating by the application of a counter-shock, but the treatment is too drastic for human application, at least in the present state of knowledge of the subject. The lungs are affected by the resulting muscular contraction consequent upon a shock, hence respiration may be stopped. In addition to the direct effect on the organs mentioned there is usually danger by burning although this risk may be absent if the contacts are good. Burns may cause such severe physical shock that collapse results, even though the electrical effects may not be excessive. Generally fatalities are due to heart failure more than any other cause, apart from secondary effects like burning. Burning is obviously likely to be more severe with large currents and especially with high contact resistances which may raise the skin to a high temperature. On the other hand burning tends to increase the contact resistance by drying up moisture and so limiting the current. With very good contacts large currents are sometimes less dangerous than small currents.

D.C. and A.C. Effects

The question whether d.c. or a.c. is the more dangerous is not a simple one. The commonly-held view that a.c. is more

dangerous by a factor of $\sqrt{2}$, the peak value of a.c. compared with d.c., is not valid; it has been shown that voltage alone is only one factor determining shock danger and it is also true that danger does not increase proportionally with voltage. In general a.c. is more dangerous at mains voltages, but d.c. is more often fatal at 1,000 V or more. Burns are usually worse with d.c., possibly partly by electrolytic action. Frequency is of consequence and it is unfortunate that a current and frequency graph shows the minimum dangerous current to be at about 50 c/s. At high frequencies much greater currents can be tolerated than at low frequencies; this is considered to be due to the lack of response of nerves and muscles at high frequencies and also to the skin effect limiting current penetration.

In h.f. treatment for certain complaints several amperes may safely be passed through the body, provided good contacts are ensured so that surface burns do not result. In medical short-wave treatment current is induced either capacitively or inductively so that there is no contact resistance and heating depends on the localized resistance paths, unlike the conduction case as usually found.

Contact Burns

When small shocks at fairly high frequencies are experienced the burn at a contact leaving the skin and causing a spark may be quite painful and difficult to heal, although the shock danger may be slight. With a non-fatal d.c. shock the after-effects are often worse than with a.c., probably partly due to electrolysis and burns. A shock from an inductive or capacitive source is almost always of short duration; its danger will depend on the stored energy, rather than the actual charging voltage. With an inductive circuit the quicker the circuit is made, or broken, the higher will be the transient voltage but (again because of the short time involved) the danger may be less. Energy is thus the chief determining factor. Induction coils operated from batteries are unlikely to give a fatal shock; although the peak voltage may be very high, it is not maintained by the low energy available from the battery.

It appears that persons liable to occasional shocks survive severe shocks much more frequently than the "man in the street," for test-room workers, electric railway linemen and track maintenance men, etc., frequently receive shocks that would be fatal to others. It is also true that fright may cause physical collapse, apart from electric shock; at least one case is on record of a fatality due to the victim believing he was in contact with a live conductor when he was not. Sleep, or anæsthesia, reduces shock danger, which is in agreement with the statement that fright can be serious in its consequences. It is also on record that when a person expects a shock the consequences are often more serious than when it is accidental and unexpected; for example, when climbing safety fences guarding live conductors and rails.

The subject of shock danger is not one that can be investigated very far in a laboratory, even on animals, so present knowledge is a combination of research into all the known conditions attending a shock, when they can be relied upon, with the results of limited experiments. Treatment of shock is beyond the scope of this article, but it can be confirmed that the first requirement is removal from contact with the source of shock and then persistent artificial respiration with early medical attention.

Load Shedding Warnings

EARLIER this year the Yorkshire Electricity Board carried out tests of a system for providing industrial consumers with a warning by radio of impending electricity cuts. These tests proved successful and the Board proposes to operate this system next winter if sufficient consumers co-operate. Signals would be transmitted from a central control which would operate a relay in a radio receiver installed on a consumer's premises, giving warnings that electricity supply would be cut off within 2–3 minutes. The relay in turn would operate a warning bell circuit or could be connected to work in conjunction with an existing public address system.

The Board is prepared to supply a receiver at cost price (approximately £50). Erection of an aerial and the wiring of any alarm circuits would be the responsibility of the consumer, although the Board is prepared to quote for carrying out this work. A special receiving licence costing 10s per annum will be required for each receiver installed. The Board will carry out tests to ensure that an adequate signal is received before definitely accepting an order for the apparatus. The scheme will cover approximately all areas with the exception of Hull and Grimsby.

VIEWS on the NEWS

By REFLECTOR

WHILE the British Electrical Power Convention was proceeding at Brighton the National Executive of the Amalgamated Engineering Union was meeting in another part of the town. At one of the sessions a member of the Executive, also an employee of the B.E.A., accused the Authority of piling committee on committee and involving wages negotiators in endless meetings, making it difficult to arrive at definite decisions. This was too much for Lord Citrine who, being conveniently on the spot, sought permission to reply to the attack. He secured this and addressed the Executive on Thursday last week. He said that the statements made were incorrect or grossly exaggerated and that if there was too great centralization it was due to the unions which had insisted on negotiation "machinery" on a national basis. It was the responsibility of the unions to suggest possible improvements. It seems to me that while the negotiating machinery of the nationalized industries is becoming rather complicated and elaborate the trade unions have little to learn from the B.E.A. in the way of bureaucracy and rigidity and in fact are largely responsible for the nature of the machinery they criticize.

* * *

I heard several complaints at Brighton of the exclusion of firms from the exhibition, some of them actually from people who did manage to get space. It is no easy matter to accommodate all the firms which wish to exhibit—possibly a hundred or so—and Brighton seems to be badly placed in this respect. It was suggested that a marquee might have been put up as an adjunct to the Floral Hall, but the atmosphere of a marquee can be extremely oppressive in warm weather (I remember the Torquay show) and most uncomfortable if there is rain. Maybe Bournemouth can do better; we shall see. It is surprising what an excellent display can be fitted into small space; an addition of 50 per cent would probably let in all comers. Another question raised is the refusal to take in "non-associated" concerns. I can appreciate that as the Convention is run by associations there may be justification for this, especially when space is at a premium, but in more "spacious" circumstances the policy might be reconsidered.

* * *

In the official list of delegates and visitors to the Convention the only indication of an individual's connection was the initials of the Association he represented. It was suggested to me by a number of people that it would have been more helpful if the name of the delegate's company or firm had been given. I entirely agree with this although the Convention Council may think it not quite in keeping with the association spirit of the gathering. I realize, too, that it means more work for the organizers and maybe an enlargement of the list. Nevertheless I present the idea for future consideration.

* * *

I have sounded manufacturers as to the effects of their latest problem—the restrictions on the use of nickel. At the end of this month, the ban on the use of copper and zinc will stop production of a wide range of lines. The new restrictions will probably make themselves noticeable principally in the finish of what articles can still be made. In this connection it must be remembered that chromium plating first requires a preliminary coat of nickel. It seems to me that manufacturers, though of course somewhat despondent at these future obstacles, are far more perturbed about what is to go under the finish, the basic raw materials of steel and aluminium, supplies of which are becoming daily more difficult to obtain. In the latter respect even those manufacturers who have been given Government contracts in connection with the rearmament programme do not appear to be any better off, for it seems now to be the practice not to make any special allocation of materials in these cases.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Power Station Performance

THE article by Mr. W. S. Burge in your issue of 8th June suggests isolating the factors in the annual performance of a power station (or a unit in a power station) as cycle efficiency, plant item efficiencies and loading conditions. This process of isolating the variables has everything to commend it so long as the foundations are sound. It does not, however, seem to be sufficiently appreciated in the power station industry that the Rankine cycle is not a satisfactory criterion for the comparison of the behaviour of practical machines using different cycle conditions. Its shortcomings were, however, well known before the turbine appeared, since it was a matter of common observation among reciprocating steam engineers that superheat resulted in a bigger gain than Rankine indicated.

The same was discovered to apply to steam turbines at an early date, e.g., in tests by Selvey in 1911 and Baumann in 1912. Baumann also suggested in 1912 his rate of one per cent reduction of stage efficiency per one per cent wetness. A superheat correction was therefore applied by turbine engineers to the efficiency ratio so that this was no longer expected to be an invariant even for an actual turbine. Later it was possible to separate the variables into the increase of cumulative heat drop by stage inefficiency and the braking effect of water in apparently reducing the stage efficiency in the wet region. These methods have been in use by all responsible turbine engineers for over a generation.

A method of taking account of cumulative heat drop mathematically was described by H. M. Martin in 1913. This required only the application of a wetness correction to make it an entirely reliable and practical method of comparing cycles. It was necessary only to calculate the performance of a standard turbine working to the cycle limits. The standard turbine may be chosen arbitrarily in a variety of ways but should preferably be one closely resembling a real turbine. A convenient standard is a turbine of constant small stage (polytropic) efficiency of say 0·85 in the dry region reduced in the wet region by Baumann's correction.

I have used this method, on lines originally devised by W. T. Bottomley, for about fourteen years and found that the computations give results in accordance with tests on good quality turbines. They show effects of temperature, pressure, vacuum and feed temperature and number of bleed points and also reheating, which tally generally with turbine makers' more elaborate step-by-step calculations. It may be noted that in all of these the Rankine criterion gives results seriously in error, particularly in the case of reheating.

The calculations take a little more time than the Rankine method even with corrections but this is surely worth while when it can avoid mistakes in the planning of future stations costing hundreds of millions sterling. The very simplicity of the Rankine method is its main defect, since it is taught in schools without caveat and contains the sort of half truth which is so readily believed. A whole school of writers has thus been led to build up entirely false structures based on the Rankine criterion and in an article in preparation it is proposed to discuss the magnitude of these errors.

Twickenham. J. WOOD.

Awards to Students

YOUR correspondent "Curious" will doubtless be interested to know that since the war my company has instituted a comprehensive educational scheme with its concomitants of monetary and other inducements for its employees.

It is the policy of the directors of Telcon to encourage and assist employees in every possible way in their quest for knowledge, and to this end the company pays their tuition fees at local technical and commercial institutes and, in approved cases, their wages during the period of absence from work for day courses of instruction.

In addition, examination entrance fees are met, as well as the cost of prescribed text books, and there is a scale of cash awards available for students who are successful in approved examinations.

Although immediate promotion is not always possible, nor is it desirable in many cases without the requisite experience, successful candidates are earmarked for consideration for higher appointments as and when the opportunity occurs.

Under the company's higher training scheme, candidates showing exceptional promise are specially groomed for executive appointments within the organization.

London, W.C.2. P. L. REED,
Public Relations Officer,
Telegraph Construction & Maintenance Co., Ltd.

Human Values in Nationalized Electricity

REFERRING to the letter from "Fiat Justitia," there is unanimous support amongst Board staffs for the views expressed. Before nationalization most engineers were confident that the change would at last mean that our salaries could be compared favourably with those of other professional men. On the contrary, however, we have slipped further back. For example, engineers in charge of large districts are paid much less than the local council housing official, or about one-third of the engineer and surveyor's salary.

It is obvious that the highly paid B.E.A. chiefs are completely out of touch with their executive staffs, otherwise they would take action to clear up the discontent which is regrettably producing an unhappy and apathetic state of affairs.

Unfortunately the E.P.E.A. is impotent and willing to accept the poorest offers for members. Even Lord Citrine at the E.P.E.A. dinner in November last said ". . . the E.P.E.A. was very restrained indeed and treated the Authority with a measure of consideration . . . etc."!

"DISAPPOINTED ENGINEER."

I AGREE with "Accountant" (*Electrical Review*, 1st June) that the word "administration" is being "worked to death" these days and I would suggest the substitution of the more accurate phrase "clerical workers" in many cases.

It is true, I think, to say that most engineers have a feeling of respect for their accountancy colleagues, partly because of the fact that they require genuine qualifications and partly because they carry quite considerable responsibilities. At the same time it will be generally agreed that many accountancy sections have expanded beyond all measure and "Accountant's" statement that B.E.A. accountants are invariably paid less than engineers of equal status could certainly not be justified.

My chief complaint is against the flood of highly paid officials with high sounding titles such as Establishments Officer, Labour Relations Officer, Welfare Officer, Education and Training Officer and a multitude of similar people who have descended upon the hard-working and underpaid engineers since vesting day.

An even more serious aspect of the situation is the fact that each of these posts carries a substantial staff of lesser lights whose salaries must amount to a considerable sum.

I note that no B.E.A. spokesman has replied to my challenge to disclose the growth of administrative and engineering staffs since vesting day, presumably a significant silence.

POOR RELATION.

Hotplate Interchangeability

I FEEL that all previous correspondents on this subject have overlooked what is probably the crux of the matter. The E.D.A. specification relates chiefly to the hotplate as a unit; one can produce a *cooker* with single hotplate circuits, i.e., Simmerstat control, using either a single-circuit plate or a 3-heat plate with the two circuits paralleled in the cooker wiring. This is quite in order and both are used by cooker manufacturers, but it does, in some measure, defeat the interchangeability specification.

There is a further detail not previously mentioned that may interfere with the effectiveness of the interchangeability specification. The shape of the underside of the hotplate cradle is not specified nor the arrangement of the support bars or undercarriage of the cooker. Certain cookers have cross members in such a position that some makes of plate will not plug into position, although fully complying with the specification.

London, N.W.7. F. BOYSEN.

Brighton Convention

Election of Mr. P. V. Hunter as Next President

THE continued fine weather last week contributed greatly to the success of the third British Electrical Power Convention. This was particularly the case on Wednesday afternoon when parties of delegates visited the new Brighton "B" power station and the Southern Cross grid substation under the guidance of Mr. W. C. Parker, controller of the South Eastern Division of the B.E.A., and Mr. C. F. Bolton, who respectively described the station and substation in our 15th June issue. Another large party went for a three-hour voyage on a sea as calm as the most wretched sailor could desire.

Mr. E. G. Batt's paper on Thursday morning was well read and well received. The proceedings are dealt with on later pages with discussions of the other papers and reports of the E.A.W. luncheon and the annual dinner.

There was a capacity attendance at the Hotel Metropole for the luncheon over which Lady Swaythling presided in her customary witty manner. After the luncheon many of the ladies (and two or three men) went along to the Aquarium ballroom as guests of Lady Self. Here there was a mannequin parade during tea which appeared to be thoroughly appreciated. Towards the close of the event an opportunity was taken to present to Lady Self the original of the portrait plate of Sir Henry Self reproduced in our 15th June issue. The presentation was made by Mrs. H. S. Pocock, wife of the managing director of the *Electrical Review*.

About 800 people assembled in the Corn Exchange for the annual dinner on Thursday evening. Mr. W. R. Herod, co-ordinator of N.A.T.O. production, was the principal guest and expressed his views on rearmament and civil production in the United States and Europe. Sir Henry Self responded in his vigorous way. Responses to the toast of the guests, proposed by Sir Vincent de Ferranti, were made by Mr. H. Neal, Parliamentary Secretary, Ministry of Fuel and Power (deputizing for the Minister) and the Mayor of Brighton (Alderman E. Simms). Afterwards there was a cabaret in The Dome.

At the final session on Friday morning Dame Caroline Haslett read her paper "Electricity—a Factor in Social Progress" and there was a brief discussion. The annual general meeting followed when the election of Mr. P. V. Hunter as the next President and of Sir John Hacking as vice-president was announced. The President, Sir Henry Self, said that Bournemouth had been chosen as the scene of the next Convention. The meeting and the Convention concluded with the customary votes of thanks.

The finals of the golf competitions forming part of the National E.I.B.A. Golf Championship were played off at the West Hove Course on Thursday last week. Mr. C. O. Boyse secured the Dennis Trophy with a round of 66, the runner-up being Mr. T. S. Crabtree (71). The winners of the four-ball - bogey competition were Messrs. H. Nielsen and J. Walker and

Mrs. H. S. Pocock, on behalf of the *Electrical Review*, presenting Lady Self with the original of the portrait of Sir Henry Self which appeared in our 15th June issue

Messrs. J. Belliss and J. R. Jones were the runners-up. The Dennis Trophy was presented to the winner by Mr. John Dennis and the other prizes were presented by the President, Sir Henry Self. Mrs. H. A. Deacon was the only lady who qualified for the finals.

ANNUAL DINNER

THE annual dinner was held in the Corn Exchange on Thursday last week. The President, Sir Henry Self, was in the chair, and Mr. W. R. Herod, Co-ordinator of the North Atlantic Treaty Defence Production Board and former president, International General Electric Co., was guest of honour.

In proposing the toast of "The Electrical Industry" Mr. Herod outlined the task which lay before the N.A.T.O. countries and compared their resources, actual and potential, with those of the nations dominated by the Kremlin. The resources of the twelve N.A.T.O. countries, he said, far exceeded those of the Soviet Union and its satellites, and, although militarily the might of N.A.T.O. was as yet mostly potential, this potential was capable of realization. More and yet more production, however, was fundamental to the development of this military strength, and under to-day's conditions the greatest hope for a considerable increase in energy available for productive use appeared to be through the increased application of electrical energy. At the turn of the century the horse-power per worker in manufacturing plants was roughly the same in the United States as in Europe, but by the middle of the century the horse-power per worker in the U.S.A. was roughly double the European figure. This increase in horse-power, mostly electrical, had been fundamental to the increase in American production.

Rearmament, superimposed upon record world civilian demand, was making a tremendous drain upon the world's resources of raw materials and tools and, unless the world's supply of the principal raw materials could be expanded, increased production in the aggregate in various countries would be limited. It was the heavy demand that had caused the shortages, rather than any decrease in supply, and this, together with an accentuated fear of scarcities, had resulted in a rapid and in some cases excessive increase in raw material prices. While, therefore, on a short-term basis better understanding must be created in the determination of international and national allocations of materials, the solution lay in the development of wider sources of the basic materials and a more stable psychological approach.

Group photographed before the annual dinner at the Corn Exchange: Sir Vincent de Ferranti, the Mayor of Brighton, Mr. W. R. Herod (principal guest), the President (Sir Henry Self), Lord Citrine and their ladies

If the N.A.T.O. countries, and particularly the United States and the United Kingdom, could continue to increase productivity per head and gross production over the next few years at half the rate of increase per year which had been evident during the last few years, they could, on a statistical basis, after a readjustment period of three years or so, carry the present programme of rearmament, short of war, along with a progressive increase in the level of living. But during the readjustment period there must be some "belt-tightening."

If the efforts of N.A.T.O. could accomplish their first objective, the maintenance of a decent peace, then, with improved technologies and possible increases in productivity, and through further integration of efforts, the hope was warranted that a substantial rearmament load could be borne, with, after the readjustment period, an increased availability of the good things of life.

The tools, equipment and instruments to increase production and productivity were in great measure electrically driven. In telecommunications, analysis and control, radar, radio communication, gun directors and other devices the electric portion was continually increasing. Basic to these and to increased production lay electric power supply. To produce more goods, more materials and more energy were needed.

There were also the extra conveniences in the home which electricity made possible. Under to-day's conditions, however, emphasis must be placed on the expansion of the availability of power for production rather than for further consumption. With all these possibilities, however, the electrical manufacturing industry and the electric power industry were fundamental.

Sir Henry Self, who responded, recalled that during the war he had had to go to Mr. Herod's predecessors and say to them "We have to try to get our heavy plant programme started up again. We have shut it down for the period of the war, and we are going to be intolerably behind in the years that follow the peace. It is now 1944: cannot we start on some allocation of capacity for the production of plant?" It was realized as a result that something should be done, "But," Sir Henry said, "it was such a little baby! We may have sinned, but, if we were going to sin, we might have gone in for something bigger!" To-day, this country was desperately hard up for materials and priorities to get its programme going. If, however, the world was to come to sanity and to an era of peace, it could only be by England and America giving the lead jointly and severally to the world and standing together in a great effort.

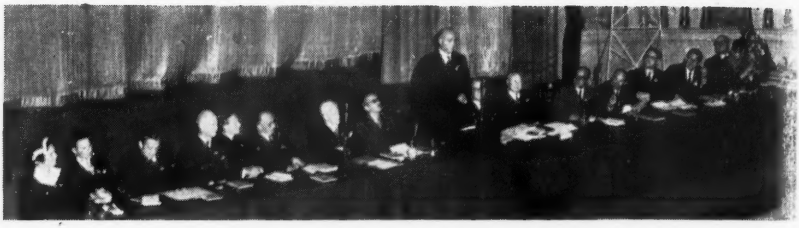
The electrical industry was one of the key industries of the world, and those who were engaged in it, whatever their nationality, thought in the same terms. He asked Mr. Herod to take back from the Convention the message that they were determined to play their part and that they appreciated the great need at the present time of a spirit of co-operative endeavour and Anglo-American productivity.

The toast of "The Guests" was proposed by Sir Vincent de Ferranti, M.C., past-president of the Convention, and responded to by Mr. H. Neal, M.P., Parliamentary Secretary, Ministry of Fuel and Power, and by the Mayor of Brighton, Alderman E. Simms. The Mayor, referring to the South Eastern Electricity Board, of which he was a member, said he had never worked with a happier body of men in his life. Under Mr. Norman Elliott's excellent chairmanship they were making good progress. There was a desire to make good under nationalization, whether people accepted it politically or not.

ANNUAL GENERAL MEETING

THE third annual general meeting of the Convention was held on Friday last with Sir Henry Self in the chair. The report of the Council and the accounts were adopted, and the nominations received from members for service on the Council for the ensuing year were approved.

The meeting then, on the motion of Sir Henry Self, unanimously elected Mr. P. V. Hunter, joint deputy chairman of British Insulated Callender's Cables, Ltd., as President for the ensuing year, and Sir John Hacking, deputy chairman, B.E.A., as vice-president. Speaking of Sir John Hacking, Sir Henry Self described him as his twin, and compared their relations with those of David and Jonathan. He had never met a man more willing than Sir John to let other people take the credit for what he had done. Sir John had been nominated as President-elect of the I.E.E., and it would be the climax to a great



The platform at the annual general meeting

career to be President of the I.E.E. and of the Convention in the same year. Mr. Hunter and Sir John Hacking thanked the delegates for their election to office.

Mr. T. F. Lister (chairman, B.E.A.M.A. Council) moved that the widest publicity be given to Sir Henry Self's presidential address, and that a copy of it be sent to every M.P. and to each Government department, trade association and other body concerned.

Mr. H. W. Bosworth (B.E.A.M.A.), who seconded, said that in his address Sir Henry had shown the position into which the electrical industry was drifting. Increased production was the key to our future existence, as well as to our comfort and prosperity, but instead of planning for this we appeared to be planning for a rake's progress of increasing scarcity of the one commodity which we were able to produce from our own resources in unlimited quantities.

The resolution was carried unanimously.

Sir George Nelson, who proposed a vote of thanks to Sir Henry Self for his services as President, made particular reference to the part which Sir Henry had played in bringing all the parties in the industry into the Convention on an equal basis and in impressing on them the need for a partnership to ensure that the greatest use was made of electricity by the greatest number of people.

Sir Henry had called the country's attention to the dire position into which it was getting, mainly because those responsible were prevented from providing the plant required to meet the needs of our national life. When those engaged in manufacturing industry called attention to the need for a bolder policy in providing power supply capacity, their views were sometimes attributed to a desire to fill their own works. Nothing could be further from the truth; they could fill their works with orders from all over the world, but they wished to help the whole of the industries of this country to improve their productive efficiency.

Sir George Nelson also thanked Sir Henry and the B.E.A. generally for their help in enabling the manufacturing industry to play its full part in the export field, so that the value of its exports was the second largest of any. That had not been done, however, at the expense of equipment for electricity supply in this country.

Sir Henry Self, in moving an omnibus vote of thanks to all those who had helped to make the Convention a success, paid a tribute to the work of the electrical Press.

E.A.W. LUNCHEON

THE Dowager Lady Swaythling, President of the Electrical Association for Women, took the chair at the Convention luncheon of the Association at the Hotel Metropole on Thursday. The toast of "Electricity and the Festival Year" was proposed by Miss Violet Markham, C.H. This was an appropriate choice of speaker for Miss Markham is a grand-daughter of Sir Joseph Paxton who was responsible for the Crystal Palace which housed the 1851 Exhibition. Miss Markham said that the men of that time stood on the threshold of a remarkable century. A surprisingly large section of the Exhibition was devoted to electricity though mainly of a telegraphic character. In some reminiscences of her grandfather, the speaker said that he was very interested in electrical phenomena. He had suggested that the electric light (had it not been so expensive) might be used for the forcing of tropical plants in this country and he had referred to the influence of "electrical disturbances" upon the garden.

Turning to the present, Miss Markham expressed the housewife's gratitude for electrical equipment and hoped to see even more smaller and less expensive appliances. She thought that women's electrical interests were safe in the hands of Dame Caroline Haslett, Director of the E.A.W., and concluded by saying that there were great new worlds to conquer.

In responding to the toast, Sir Henry Self said he would add to the four incomprehensible things mentioned by Solomon the endurance of women. The electricity industry had to tell them that there was no jam for them in the morning, only in the evening. Nevertheless the only thing which would save the power situation was the contriving of women. He regretted the shortage of power and showed how demand had overtaken available capacity. The E.A.W. could teach people how and when to use electricity. Sir Norman Kipping had advocated "Operation Isaiah," the filling in of the valleys and reduction of the peaks. He (Sir Henry) said that he would substitute "Operation Ezekiel," for the dry bones of our economy could only live if electric power went through the whole system.

In her usual amusing way, Lady Swaythling proposed the health of the guests and Sir Montague Hughman responded in similar vein.

Electricity as a National Asset

Discussion on Papers by Messrs. H. H. Mullens and N. Elliott

AT the Wednesday morning session of the Convention, MR. MULLENS presented his section of the two-part paper and MR. ELLIOTT followed. The discussion was opened by MR. E. R. WILKINSON, who said that the electrification of railways would save about 10 million tons a year of good quality coal. This represented a money saving of £30 to £35 million a year, which would cover the capital charges and annual outgoings attributable to a capital expenditure of some £300 million, apart altogether from the other advantages of railway electrification. Had the recommendations of the 1931 Weir Report been carried out at that time we would have saved coal equal to the entire output of the National Coal Board for twelve months—200 million tons.

Another seven million tons of coal could be saved every year by the electrification of the coal mining industry. That would be worth not less than £20 million a year, so that the country could afford to spend and ought to spend from £150 to £200 million to effect that economy.

It had often been said that one justification for nationalization was that it would enable the necessary capital to be raised, but the three basic nationalized industries—coal, transport and electricity—were crying out for the spending of capital in order to effect economies.

Mr. Mullens had stated that it was only where a cheap source of fuel such as waste heat was available, or where low-pressure steam was needed for process purposes, that private generation was economical. Mr. Wilkinson agreed, but would go further and say that it should not be left to the industrialist to work out the process steam proposition best suited to his own requirements without regard to other circumstances. The Area Boards and the Central Authority should consider, with the industrialist, what was the best scheme in the general interest.

MR. J. ECCLES (Merseyside and N. Wales E.B.) said there would be general agreement in the Convention that more electricity was

Mr H. H. Mullens

Mr. N. Elliott

Mr. E. R. Wilkinson

essential if this country was to survive as a world force, but how was that to be "put across" to the planners? The country no longer had overseas investments to pay for its imports of raw materials and food, and could obtain them, if they were available, only by selling its products abroad. Anything, therefore, which would cheapen the production of those products would play a part in our survival. The greatest single contribution to this would be more horsepower, intelligently applied, and that meant more electricity.

The Central Authority, acting with the manufacturers, the consulting engineers and the contractors, should organize the site work at power stations as a military operation, so that by careful planning of the delivery of materials and of the work perhaps a year might be saved in erection. The Central Authority should intensify forthwith its programme of operational research, with the object of reducing the number of breakdowns, simplifying maintenance work and improving the thermal performance. The Area Boards should re-examine their capital projects with a view to simplifying the work and eliminating "frills." A realistic assessment of the justification for duplicate supplies should be made and Area Boards should also examine the possibilities of load control devices.

Nothing that the industry could do, however, would provide a complete solution. There was imperative need for the Government to make a realistic assessment of priorities and ensure that they were not asking the British workman to compete with his American counterpart with one hand tied behind his back through lack of adequate mechanical power.

MR. A. C. HAZEL, speaking as a manufacturer of appliances operated by gas, electricity, paraffin and solid fuel, and therefore reasonably unbiased, dealt with the subject of space heating and said that

Mr. J. Eccles

Mr. A. C. Hazel

Mr. R. H. Rawll

Dr. S. Whitehead

in his own home he had a solid-fuel-fired boiler to heat four hot-water radiators and provide hot water, with an electric circulator in the calorifier as a booster and to enable the boiler to be dispensed with in summer. For heating the bedrooms and study he used oil-filled electric radiators, which were switched on at 7 p.m. and off at 7.30 a.m., thermostatically controlled. Once a house was warm, it was comparatively simple and economical to keep it so, and by using electricity at off-peak times he reduced his consumption of solid fuel and was able to have a smaller boiler than would be necessary if it had to supply ten radiators. The use of central heating was likely to expand, and the supply industry should bear in mind the use of off-peak heating and ripple control. The appliances of which he spoke had a thermal carry-over of nearly an hour and so no inconvenience need be suffered by the consumer by a temporary switch-off.

MR. R. H. RAWLL, referring to electronic computing machines, said that the electronic chess-playing machine described by Mr. Elliott might at first sight seem useful to those in the supply industry who had to spend much time obtaining consents and approvals from Government Departments, but since, apparently, it took 10^{95} years to decide on its first move it might be better to conduct the negotiations in the normal way.

He expressed the hope that there would be no difficulty in standardizing a method of rating h.f. heating apparatus.

DR. S. WHITEHEAD (E.R.A.), speaking of co-operation, said that if an attractive idea was introduced to a human group there was at once a considerable interaction between individuals; first a small number adopted the new idea, and they reduced the resistance of the rest, with the result that a kind of landslide occurred until nearly everybody was converted. The introduction of mercury arc rectifiers was an example. That gave great flexibility to the electrical

Mr. A. N. Irens

Col. B. H. Leeson

industry and was of great advantage; but when it came to using these devices in a manner convenient to electricity supply the situation was very different; there was a very low degree of interaction between consumers and propaganda was ineffective. The supply industry had to bring about interaction between consumers while avoiding prying into what were regarded as people's private affairs.

He defined co-ordination as the use of electricity in such a way as not to interfere with or disturb other users. High-frequency processing was liable to cause disturbance outside the confines of the factory, and in welding a recent process of high-frequency injection was liable to be troublesome, though a solution of the problem appeared to be on the way. The medical use of electricity might be such a nuisance that wavelengths might have to be allotted to it. However, most of the problems of this nature had been solved or seemed capable of solution. The study of the causes of disturbance was of benefit both to the disturber and the disturbed, leading to the discovery of unsuspected defects.

MR. A. N. IRENS (South Western E.B.) said that in addition to his association with the South Western Electricity Board he was concerned with looking after the electrical interests of an industrial factory. He welcomed Mr. Mullens's statement that use should be made of any available sources of energy in the country, having felt that for a long time, and at a time when that feeling was not generally shared. During the war, when there were large engines of 4,000 h.p. or so running continuously on test for hundreds of hours it seemed wasteful to push all that energy into steam when the country was so short of fuel, but the supply authority had been horrified by his suggestions and took the view " You must either take our juice exclusively or make your own arrangements." He had to see the Ministry of Fuel and Power before anything could be done, but there was no difficulty, technical or financial, about it. People who had large blocks of heating power for process work should be encouraged to float across the line in parallel and save at least a pound of coal for every kWh generated.

It was intimated that the authors would reply in writing, in view of the lateness of the hour, and the session concluded with a vote of thanks to them, proposed by COL. B. H. LEESON (B.E.A.M.A.).

Refrigeration Industry

Discussion on Mr. E. G. Batt's Paper

AFTER the reading of " A Survey of the Refrigeration Industry " by MR. E. G. BATT the discussion was opened by MR. E. G. ROWLEDGE (B.R.A.), who said that domestic refrigerator manufacture now accounted for more than half the £22·8 million which represented the production of the British refrigeration industry as a whole. It would grow far bigger in output and technical skill when present shortages disappeared. One of the most important shortages to be overcome was that of properly qualified technical personnel. The National College should do much to cure this, and he hoped that the Electricity Boards would support it and take full advantage of the manufacturers' service training schemes.

The modern technique of precision manufacture and leak detection had done much

Mr. E. G. Batt

Mr. E. G. Rowledge

Mr. K. J. R. Cocke

Mr. W. N. C. Clinch

to contribute to the present trouble-free sealed system.

Many field faults on domestic refrigerators, in particular, were the result of low voltage, though it was extremely difficult for the service man to detect the original cause. One trouble was the return to the factory of systems which revealed no fault on examination; many of these had been removed on account of unsatisfactory running under low voltage conditions. Tests on compressor capacity, such as the volumetric tests in works, could be seriously affected by changes in frequency, and on at least one occasion a large number of units had been rejected owing to the frequency being a few cycles down.

A number of large and successful heat-pump installations were in use in Switzerland, and a number of smaller ones in the United States. An experimental installation had also been made in Norwich. With the present high costs of solid and liquid fuels he believed that reverse cycle heating could be economic in many large public buildings and office blocks, provided the heating system was designed for the heating medium and that there was an ample and easily-tapped source of low-grade heat available. The use of the heat pump would make it possible to recover some of the 60 per cent or so of the fuel heat which the generating engineer was at present compelled to throw away.

Mr. K. J. R. Cocke (B.R.A.) pointed out that although there had been a tremendous growth in the use of domestic refrigerators, the expansion of commercial refrigeration was disappointing. Emphasizing the seriousness of small leaks in domestic refrigerators, he said that a loss of one ounce of refrigerant in 15 years would be enough to cause a serious reduction in efficiency, although it was equivalent to only a $\frac{1}{2}$in cube of refrigerant in a year.

This country had not been far behind the United States in the production of hermetically-sealed refrigerators. Great progress had been made in their design during the last eighteen years; the size of the compressor compartment had been reduced from 10in diameter and 18in in length to 6in diameter and 8in in length, and the change from sulphur dioxide to Arcton 6 meant that corrosion had ceased to be a difficulty. Synthetic resins could now be used, greatly reducing the amount of water in the motor winding. It was still necessary to get rid of that water from the motor by most complicated dehydration processes to prevent droplets of water freezing out from the Freon refrigerant at the first part of the refrigerating system to go below freezing point, which was the 12ft capillary tube, which had a diameter of only 1/30,000th of an inch and could easily be blocked.

It was essential, particularly in the commercial and industrial field, to have well-educated engineers to take care of design and servicing. The present domestic system, however, was one of the easiest of domestic appliances to service.

Mr. W. N. C. Clinch remarked that little was said about the absorption type of refrigerator, which was not affected by frequency or by voltage, within reasonable limits. He endorsed all that was said in the paper on the value of training.

Dr. E. H. Rayner (E.R.A.) said that about fifteen years ago Professor R. W. Wood, of the Johns Hopkins University, United States, told him of an experience which he had had when a little tungsten filament connected to a 6 V battery, which he kept alight to get electrons from it, remained alight after the battery had been switched off. He investigated the matter and found that the material inside the tube was hydrogen. He mentioned this to Dr. Whitney, who was then the head of the research laboratories of the General Electric Co. of America, who saw in it a method of ensuring that refrigerators were absolutely gas-tight. The hydrogen with which Professor Wood heated up his filament was atomic, not molecular, hydrogen and the atomic hydrogen went on giving out a great amount of heat when the operation ceased by being turned into molecular hydrogen. That was the beginning of atomic hydrogen welding. The subject of refrigeration, therefore, was not far removed from that of electronics, with which Mr. Humphreys had dealt earlier.

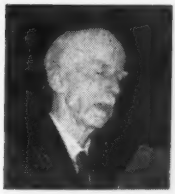
Mr. E. G. Batt, replying to the discussion,

said that hire purchase was essential for the proper development of the refrigeration industry, but customers using this method should be required to pay the cost of the financial accommodation afforded them; the cost should not be subsidized from other sections of the organization's business.

The main use of commercial refrigeration equipment was the storage of food, and he could only conclude that it was shortage of food in this country to which the lack of progress in this branch was due.

Radio interference was being dealt with by an Advisory Committee recently set up by the Postmaster-General. Where a commutator motor was used a suppressor should be fitted, but if interference arose from a thermostat it was because it was defective and it should be put right or replaced.

He had not overlooked the absorption type of machine, but, while it might not be subject to some of the " teething troubles " mentioned in the paper, a compressor machine of the same capacity would operate at about a quarter the cost of an absorption machine.



Dr. E. H. Rayner

Lord Citrine

LORD CITRINE proposed a vote of thanks to Mr. Batt, and in the course of his remarks said it would have been seen from the newspapers that morning that the B.E.A., and he himself, had been taken to task in public for relying on the democratic method of consultation and committee work in carrying on their activities. He deprecated very strongly attacks being made on a public body by people who had full opportunity to make criticisms in the centre of the organization concerned, and he hoped to have an opportunity of answering the criticisms to which he referred in the place where they had been made.

Electricity and Social Progress

Discussion on Dame Caroline Haslett's Paper

DAME CAROLINE HASLETT, in presenting her paper on " Electricity—A Factor in Social Progress," remarked that throughout the whole week of the Convention there had gone a feeling which could almost be described in the words of a well-known man, " Give us the tools and we will finish the job." She would vary that by saying " Give us the capital to produce electricity and we will make the country prosperous."

Mr. R. H. COATES (Southern Division, B.E.A.) emphasized the necessity for education in the advantages of electricity, which was not always, he said, fully appreciated. It was when considering the disabled that the full wonder of electricity could best be appreciated. By the use of electricity they could have a full and useful life. To the infirm, electricity was the " sedan chair " which carried them through life.

Dame Caroline Haslett

Mr. R. H. Coates

Mrs. F. FORREST spoke on the subject of rural electrification. She said that it was impossible to over-estimate the national rather than the local importance of speeding up the electrification of outlying areas, for a healthy and contented agricultural population was essential to the well-being of the community. Where the drift to the towns occurred it was often due to the women's influence; they were no longer content to go on with the drudgery of oil lamps and open fires. The South Western Board was tackling this problem with great keenness, and in the last year had connected

Mrs. F. Forrest

Mr. L. Gosland

up over 900 farms, but its ability to continue with the work depended on its earning sufficient revenue on the capital outlay, so that the extent of development possible largely depended on a live and intelligent sales technique.

The service centres seemed to be the one connecting link between the Board and the general public. The personnel of the service centre were in a position to do lasting good or irreparable harm, and should therefore be chosen with the greatest care and well trained.

Mr. L. GOSLAND (E.R.A.) referred to ways in which research and development engineers could help to bring about the state of affairs that Dame Caroline desired. No one who compared the efficiency of modern lighting with what it was fifteen years ago could doubt that research had still great things to offer in this field. For heating the situation was somewhat different, and improvement must be sought rather in the efficiency of utilization, which was still lamentably low in many cases, than in the conversion of electrical energy into heat energy.

Power-using appliances, except in limited fields, were not so much used, possibly because capital costs were high and the use of the apparatus relatively infrequent. In this field, the direction of advance seemed to be in the development of appliances which were small and which worked slowly but automatically, with small power consumption. The advantages of electric laundering were undeniable, but the situation required some thought if it meant that half a million housewives would be using £30,000,000 of equipment only for a couple of hours on a Monday morning to do the washing. There was great scope, he said, for the development of slow and automatic washing processes.

The electronic engineer could also help the housewife. Most people had heard of the "electronic tortoises," which, when placed on the floor, moved slowly to and fro looking for a position of uniform illumination. They might be given a small brush and a very small motor, and then the housewife could take one and instruct it not to rest until it had reduced the whole floor of the house to a uniform and excellent state of reflectance.

Dame Caroline Haslett replied briefly to the discussion, which had had to be curtailed for lack of time. A vote of thanks to her for her paper and for her work for the electrical industry generally was accorded on the motion of Mr. E. R. Wilkinson (E.D.A.).

C.I.G.R.E. LUNCHEON

AS we have reported, the members of the Council of the Conférence International des Grands Réseaux Electriques (C.I.G.R.E.) were guests of the British Electrical Power Convention at Brighton. At the Grand Hotel last week they held their first meeting in this country when it was discovered that neither the British Electricity Authority nor the Electricity Boards were represented on the Council. To remedy this deficiency Mr. H. Nimmo was elected to the Council to represent the Electricity Boards.

At the C.I.G.R.E. meeting *(left to right):* Messrs. W. Anderson, J. Tribot-Laspière, Sir Vincent de Ferranti, C. E. Montanes, C. Redaelli, R. A. Schmidt, W. Borgquist, C. le Maistre, P. V. Hunter, E. Cytborek and R. A. McMahon

The members visiting this country were Dr. R. A. Schmidt (Switzerland), the President, Mr. W. Borgquist (Sweden), Mr. C. E. Montanes (Spain), Mr. W. Anderson (Canada), Mr. C. Redaelli (Italy), Mr. E. Uytborck (Belgium), Mr. C. le Maistre (I.S.O.) and Mr. J. Tribot Laspière (France), secretary-general. At a luncheon party they were joined by Mr. P. V. Hunter, chairman of the British National Committee, Sir Vincent de Ferranti, vice-chairman, and Mr. R. A. McMahon, secretary.

MID-SUSSEX HEADQUARTERS

DURING the Brighton Convention an opportunity was taken of visiting Mr. H. Pryce-Jones, manager of the Mid-Sussex Sub-Area of the South Eastern Electricity Board, at his "new" headquarters in North Road, Brighton. Actually the building dates from 1890; it was originally part of the first Brighton electricity works and older people still call it that. The works was superseded by the Southwick power station in the early part of the century but it is still the main distribution centre for the district. Also the offices of the Brighton undertaking were later moved to the extensive premises in Castle Square where, incidentally, there are excellent showrooms with fine window displays.

Mr. Pryce-Jones, by virtue of his removal to the North Road premises (now known as Mid-Sussex House), becomes the fourth of his "line" to occupy these offices. The original incumbent was Mr. Arthur Wright, who was succeeded as borough electrical engineer by Mr. John Christie, Mr. W. N. C. Clinch and finally by Mr. Pryce-Jones, who held the post on nationalization. We reproduce photographs of the building and of Mr. Pryce-Jones and his principal officers.

Standing: **Messrs. G. R. A. Carr (Sub-Area engineer), S. L. Robinson (secretary), F. W. Shaw (accountant) and F. Lynn (commercial officer).** *Seated:* **Miss N. Greenhill (manager's secretary), Mr. H. Pryce-Jones (manager) and Mr. A. M. Harker (deputy manager)**

Resale Price Maintenance

Government's Proposals Outlined

A STATEMENT on resale price maintenance was published by the Board of Trade last week. After giving a general description of the practice, its operation and effects, and the steps already taken by the Government, the document proceeds to outline the new proposals.

The Government's objection to resale price maintenance is that by eliminating price competition between shops with different levels of cost, it prevents price reductions which could and should be made; and that the collective punitive action by which most fixed resale prices are enforced amounts to a private system of law which in effect is outside the jurisdiction of the Courts.

Proposed Legislation

The Government will, therefore, introduce legislation to make illegal collective arrangements designed to ensure that goods shall be sold at or above specified retail prices and any indication by a manufacturer or other supplier of goods of a resale price for those goods unless that price is clearly stated to be a maximum price.

Generally speaking the Government considers that this legislation should have effect over the whole of industry and trade; but in drafting the legislation the Government will take account of any cases where it may be established that exceptional conditions would render the operation of the proposed provisions unworkable or undesirable in the public interest.

In the Government's view unfair or excessive methods of price competition would be a matter for Parliament to deal with on its merits; fears of their possible emergence in the future cannot constitute a valid reason for allowing harmful restrictive practices to continue.

Checking Rise in Prices

In an explanatory statement the President of the Board of Trade, Sir Hartley Shawcross, said that the abolition of resale price maintenance was only one of several proposals which he was considering with a view to checking the rise in prices and ultimately, promoting a reduction. He did not pretend that it would produce any dramatic reduction in prices but it would tend to make reductions in prices easier in regard to some things; a very wide range of commodities was covered by these minimum price fixing agreements. The importance of their abolition was, however, that this would in the long run promote healthy competition and encourage greater efficiency in the retail and distributive trades. The only people who need be afraid of the abolition of resale price maintenance were the unenterprising inefficient traders who wanted to be cushioned and protected against competition.

Monopolistic and restrictive practices outside public control were often a bad thing. He was against all restrictive devices in the ordinary way. Trade unionists as well as industrialists should realize that in full employment they were not necessary. Sir Hartley said they did not want to interfere in the least in trade union or industrial arrangements. They wanted, in consultation with both sides of industry, to see that the progressive elements were not held back by the least efficient.

Public Monopolies

It was said that they were illogical about that because they had in their nationalization programme created certain monopolies. That was not altogether true. There were so many restrictive arrangements in the industries they had taken over that none of them could be said to have been a notable example of competitive enterprise. They put under public control only industries which they considered vital to the nation and which, for one reason or another, they did not think were being efficiently run in the interest of the public. A private monopoly was run for the benefit of the private shareholders. A public monopoly was run for the benefit of the public and under public control.

PERSONAL and SOCIAL

News of Men and Women of the Industry

As we report elsewhere in this issue, **Mr. P. V. Hunter,** C.B.E., has been elected President of the British Electrical Power Convention for the ensuing year. Mr. Hunter, who is deputy chairman of British Insulated Callender's Cables, Ltd., and chairman or director of a number of associated companies, was born in Norfolk in 1885. He was educated at Wisbech School and at Faraday House, later receiving training with Willans & Robinson and with Robert Hammond. He joined Messrs. Merz & McLellan in 1904 and became head of their electrical department. During the first world war he was "lent" to the Admiralty for anti-submarine work when he was associated with the development of the "Asdic" system. During the last war he developed the buoyant cable which contributed largely to the defeat of the magnetic mine. In 1919 Mr. Hunter was appointed chief engineer to Callender's Cable & Construction Co., Ltd.; he became a director in 1937 and subsequently engineer-in-chief and deputy chairman of the companies merged under the title of British Insulated Callender's Cables, Ltd.

Mr. P. V. Hunter

Mr. Hunter has been chairman of the National Register of Electrical Installation Contractors since 1925 and he was President of the E.I.B.A. for 1939-41. He has for many years been active in many other electrical directions, including the International Electrotechnical Commission, C.I.G.R.E., the British Standards Institution, the Electrical Research Association, etc. He was elected an associate member of the Institution of Electrical Engineers in 1910 and became a member in 1914. He was President in 1933 and early this year he was honoured for his services to the Institution and the electrical industry by election as honorary member.

Dame Caroline Haslett, D.B.E., J.P., a member of the British Electricity Authority, will head a delegation from the Authority to the Ninth Congress of the International Institute of Management which is to be held at Brussels from 5th to 11th July. The delegation includes Mr. E. R. Wilkinson, commercial manager; Mr. E. Long, a deputy chief accountant; Mr. T. Mainprise-King, an assistant director of establishments; Mr. E. Butterworth, secretary of the Merseyside and North Wales Division; and Mr. R. S. Atkinson, generation engineer (operation) of the South Eastern Division. Dame Caroline is a member of the Council of the British Institute of Management.

Mr. H. F. Carpenter, F.C.I.S., F.S.A.A., who, as has already been announced, is relinquishing his appointment as secretary of the British Electricity Authority upon his retirement in the autumn, has been appointed a member of a committee which has been set up by the Authority to review the organizational and administrative efficiency of the electricity supply industry and relevant matters.

Mr. A. B. Bowater, personal assistant to Mr. E. T. Hippisley, manager of the Traction Department of the British Thomson-Houston Co., Ltd., is retiring this month after forty-four years' service with the company. Mr. Bowater received his early education at the Bablake School and the Technical College, Coventry. Except for 3½ years on the staff of the Ministry of Munitions during the 1914-18 war, Mr. Bowater has been engaged on commercial work in the B.T.H. Traction Department, which he joined in 1909. He has been an active member of the B.T.H. Operatic and Dramatic Society.

Mr. A. Cox

Mr. A. Cox is now London branch manager of Prestcold Refrigeration (Pressed Steel Co., Ltd.), whose offices and showrooms are at Sceptre House, 189, Regent Street, London, W.1.

Mr. L. G. Burrows has rejoined Crypton Equipment, Ltd., and has been appointed area manager for the Midlands and South Wales. Mr. Burrows was with Crypton as West of England representative until three years ago when he left to take up a position, which he has now relinquished, as equipment representative for Brown Brothers, Ltd.

Mr. D. G. Denoon, joint publicity manager, British Insulated Callender's Cables, Ltd., and **Mr. C. H. Chaplain,** manager, Publicity Department, the British Thomson-Houston Co., Ltd., have been elected chairman and vice-chairman respectively of the B.E.A.M.A. Publicity Committee for the session 1951-52.

Mr. William Jones has been appointed manager of the Bristol office of Brookhirst Switchgear, Ltd., in succession to the late Mr. H. J. Barber. Mr. Jones has had nearly thirty years' experience with the company, including seventeen years in the London area, first in the capacity of service engineer and latterly as sales representative.

Mr. E. J. Bull has been appointed manager of the Manchester branch of the Sloan Electrical Co., Ltd., as from 1st July, following the recent death of Mr. H. Baird. Mr. Bull joined the company at Bristol in 1925, became assistant branch manager at Exeter in 1934 and was transferred to Manchester in the same capacity in 1938.

The Railway Executive announces the appointment of **Mr. J. A. Broughall,** principal assistant to the executive officer (electrical engineering, new works and development) to be executive officer of the section at Railway Executive headquarters. Mr. Broughall was educated at Queen Elizabeth School, Barnet, and University College, London. He was a pupil at the Dick, Kerr Works of the English Electric Co., Ltd., and later joined their Central Design Department. He entered the L.M.S. Railway in 1931 and in 1935 was appointed assistant (generation and distribution). He was responsible to successive chief mechanical and electrical engineers at Euston and Derby for power supply and distribution, including the reconstruction of Stonebridge Park power station for high pressure and for 50 c/s generation, the conversion of substations supplying the Euston-Watford and Liverpool-Southport electrified lines to 50 c/s and for remote control. Since 1948 he has been chairman of policy committees for the standardization and specification of electrical equipment. In 1950 he was appointed principal assistant to the newly formed electrical engineering (new works and development) section of the Railway Executive.

In perfect weather some 3,000 employees with their families and friends watched the G.E.C. Witton amateur sports and gymkhana which was held on 16th June at the Magnet Club Sports Ground of the Witton Works, Birmingham. Sir Harry Railing, chairman of the company, with Lady Railing, O.B.E., and members of the Witton management were present. For the fourth year in succession the Witton relay team won the men's 440 yards relay for the Midland Works and Business Houses Sports Association championship. In the departmental tug-of-war for the M. J. and A. H. Railing challenge cup, the switchworks team recorded their third victory. The directors' cup for the best all-round department was won by the Apprentices Association, while the Leslie Gamage jubilee cup for the fire brigade one man drill was again won by Mr. D. Perry of the Witton Works fire brigade. Miss B. Herring was easily the best all-round girl athlete, and thus becomes the holder of the H. N. Whitford cup. At the close of the meeting Lady Railing presented the prizes and the day's activities were brought to a close with a dance which was held in the Magnet Club.

Lady Railing, O.B.E., presenting the Leslie Gamage Jubilee Cup to Mr. D. Perry, winner of the fire brigade one-man drill for the second year in succession

Cloudy but rainless weather prevailed last Saturday when the London establishments of the **General Electric Co., Ltd.,** held their 26th annual sports meeting at their Wembley ground last Saturday. The programme included 48 events and the athletics were supplemented by numerous side-shows. The "Leslie Gamage" trophy for the leading London establishment was secured by Head Office for the third successive year. The Hon. Mrs. Leslie Gamage presented the many challenge cups and prizes at the conclusion of the programme.

OBITUARY

Mr. E. Statham.—The death occurred on 15th June at the age of fifty-four of Mr. Edgar Statham, A.S.A.A., F.R.Econ.S., secretary-accountant of the North Staffordshire Sub-Area, Midlands Electricity Board.

PARLIAMENTARY NEWS

From Our Special Reporter

THE Chancellor of the Exchequer (Mr. Gaitskell) made a statement in the House of Commons last week on the investment programme. He said that the heavy new defence demands on the engineering industries must involve some check to civil investment at home. In consequence there would this year be no increase in the supplies of plant and machinery available for home industry, while in 1952 and 1953 there must be a substantial reduction. In view of the greater uncertainty caused by the impact of defence production and material shortages, he did not propose to publish for 1951 or 1952 a detailed investment programme of the kind prepared in previous years with figures for individual industries. He could, however, give broadly the level of investment which they hoped still to achieve.

The total fixed investment in 1951, including a substantial amount of defence investment, might amount to £2,230 million (in terms of the prices ruling at the end of 1950), compared with £2,162 million in 1950. Within this total it was intended that investment in coal, electricity, gas, coke ovens, railways, roads and petroleum would be higher than in 1950—in the first two cases substantially higher. The programme of new industrial building for other manufacturing industries would continue at about the same rate as in 1950, but a proportion of the work would be on defence projects and fewer licences would, therefore, be available for ordinary civil projects. The housing programme would be maintained at 200,000 houses a year. The volume of Government building would be checked and in 1952 would be below the 1950 level. The Government had also decided on two special measures. The building of all new offices would, for the time being, be prohibited, except where work had already been authorized or in other very special circumstances, or in the case of offices which were an integral part of industrial establishments. Secondly, it was proposed to ban all building projects for entertainment purposes costing more than £5,000. Projects costing less would be licensed only if there were especially strong reasons for permitting this work to be done.

With regard to the reconstruction of blitzed towns and cities a special survey would be made area by area to decide, in the light of the supply of labour and materials, what might be spared for this purpose. Work already authorized would be completed and new work would be approved as and when this could be done without holding up more urgent and important projects such as defence and housing. The ban on new office building would not therefore apply to blitzed areas.

Purchase Tax on Washing Machines

During the closing Committee stages of the Finance Bill, Col. Hutchison (Conservative) moved an amendment to reduce the new purchase tax of 66⅔ per cent on gas washing machines. He said that when these machines were mentioned, people at once thought of them as semi-luxury articles, and their minds turned to electric washing machines and electric refrigerators, costing about £100. But, in fact, the gas washing machine was a poor man's article. It consisted of a hand operated agitator and a clothes wringer. Being a hand operated machine it saved electricity and consequently had a measure of fuel economy in it.

Mr. L. J. Edwards, the Economic Secretary to the Treasury, resisting the amendment, said that Col. Hutchison was seeking to distinguish between gas and electrical appliances. A few weeks ago he (Mr. Edwards) had a long talk with the secretary of the Electrical Development Association about proposals for tax increases in the electrical field. He did not think he could get away with it if he told him that they were letting gas off but not electricity. Maintenance of exports and the defence programme were the over-riding considerations here, and they must use the tax machine to try and curtail home demands.

The amendment was negatived.

Television Sets and Valves

Mr. C. I. Orr-Ewing moved an amendment which, he explained, taken with two further amendments, had a threefold object. It was to leave unchanged the purchase tax on radio and television sets and on radio valves and cathode ray tubes. It also sought to relieve valves and cathode ray tubes from the increased purchase tax, and thirdly, if that could not be done, it sought at any rate to relieve replacement valves and cathode ray tubes from increased purchase tax. Dealing with the matter first of all on the score of defence, he said that during this year the Government was going to absorb only some 30 per cent of the output of the radio industry. It was true that Government orders existed, but they existed for small numbers of high quality goods. In the mass-production field, which was the field in which radio and television sets were made, the orders were small. They had practically

no orders for the expendable units. In fact this year only 7½ per cent of the mass production side of the industry would be absorbed by Government orders. Therefore there was a grave danger that if the deflation which the Chancellor said was the object of his Budget took place and throttled back demand they would have unemployment and would lose the labour force of women which would be badly needed when the large defence orders came along. In the valve industry the position was even worse.

On the export argument the radio industry had expanded its exports from £2 million worth in 1939 to over £20 millions a year to-day, so that it had at least pulled its weight if it had not done even better than the majority of industry in a tenfold expansion of exports. The purchase tax record in this trade was a most unhappy one. At the end of the war they were allowed to make utility sets. In October, 1947, the purchase tax was increased from 33 to 50 per cent. In April, 1948, it was further increased to 66⅔ per cent. In June, 1948, it was reduced to 33⅓ per cent, and in April, 1951, it had been increased again to 66⅔ per cent. It was very difficult to keep a smooth production flow in such circumstances.

Mr. L. J. Edwards said that there must be a reduction in the home consumption of the products of the radio industry if the industry was to bear the growing load of defence work and also make a higher contribution to exports. He was quite sure that the industry could not take on defence orders and expand exports and at the same time have home demand or home consumption running at current levels. So far the Ministry of Supply had placed orders on the radio industry for £50 million worth of products. The 1950 estimate of the total output of the industry was £80 million worth. He did not think it likely that they would run into heavy unemployment in the industry, but if they did they would arrest that tendency without delay. With regard to exports, last year the purchases at home of radio sets amounted to £18½ million worth; exports were worth £3½ millions, so there was a pretty firm home basis there. In the case of television sets the home amount was £17½ million; exports were quite negligible. There was no likelihood that the industry would be in difficulty in developing export markets because it had not a firm home basis.

With regard to valves, so far as he was aware, the high cost to the public of replacement valves was not due to tax but was primarily due to the price maintenance policy of the principal manufacturers. If, as he understood, they sold valves at a loss to set makers and recouped themselves handsomely by charging much higher prices for sales for replacement purposes, the remedy would appear to be substantially in their own hands.

But the important point was that the overriding need was to increase exports. They must curb the pressure of home demand. He was sure that this increased purchase tax was the way to do it. With increasing demands from defence and exports, the radio industry would not be able to sustain its production for all these fields.

The amendment was negatived.

Electricity Boards and Hire Purchase

In reply to a question on hire purchase trading, Mr. Gaitskell said he was satisfied that the Area Electricity Boards were fully aware of the Government's policy and in particular of the request to the banks not to provide further finance for hire purchase activities. He was asking the Minister of Fuel and Power to draw the attention of the Boards again to the undesirability of any unreasonable expansion in hire purchase.

Gas and Electric Fire Guards

Sir Thomas Moore asked the Minister of Local Government and Planning whether he would consider sending a circular to local authorities advising them that all future houses built by them should be fitted with suitable guards on unprotected gas or electric fires.

Mr. Dalton said he would, as soon as he had the recommendations of the Interdepartmental Committee which was examining these matters.

Norwegian Imports

NORWAY increased her imports of electrical goods last year but not at as high a rate as in the two previous years. The following table shows the chief items with notes of increases or decreases compared with 1949. It will be seen that there were fairly large advances in generators, transformers and automatic telephone equipment, but declines in radio goods, motors and the smaller cables and wires. Principal suppliers were Britain, Sweden, United States, Denmark, Holland and France. (The exchange value of the Norwegian Krone is about 1s 0d.)

Class of Equipment	1950 Kr.(000)	Inc. or dec. on 1949 Kr.(000)
Electric motors	29,330	— 1,910
Generators	16,123	+ 6,663
Transformers	8,956	+ 4,576
Batteries and parts	4,016	+ 606
Accumulators and parts	3,190	— 70
Incandescent lamps	6,160	+ 395
Radio valves	2,311	— 1,169
Radio, telegraphic, etc., material	3,888	— 1,142
Automatic telephone apparatus	6,897	+ 1,987
Lead covered cable up to 40 mm/ diam	7,156	— 1,058
Ditto 40 to 80 mm diam	6,530	+ 146
Ditto over 80 mm	320	+ 190
Other electrical wire	3,828	+ 328
Vacuum cleaners	1,321	— 299
Porcelain insulators, h.v.	4,137	+ 1,252
" " l.v.	2,310	— 110

OVERSEAS ELECTRICAL TRADE

Exports Maintained in May

LAST month the improvement in exports of electrical apparatus and machinery which was in evidence in April was maintained, the total at £14,137,537 being £117,740 above the April figure and £2,739,911 above that for May, 1950. Compared with the corresponding month of last year, the figures in all but twelve of the classifications show improvements, the items in which declines are recorded including certain types of generators, motors, cables and accumulators; telegraph, telephone and signalling apparatus; and house service meters. A full analysis of the figures appears in Table I.

Taken as a whole, exports of goods and apparatus, as distinct from machinery, advanced from £6,706,386 to £8,483,946. India, increasing its purchases from

TABLE I.—ELECTRICAL EXPORTS

Class	May, 1951	May, 1950
	£	£
Telegraph and telephone cables and wires (submarine)	12,711	66,307
Ditto, not submarine	556,098	626,248
Wires and cables, paper insulated	622,504	649,392
Ditto, rubber insulated	538,880	286,036
Ditto, cotton, silk or artificial silk insulated	70,415	46,849
Ditto, enamel, glass or asbestos insulated	101,671	50,315
Ditto, other	225,251	128,533
Commercial radio apparatus	597,094	425,632
Domestic radio apparatus	413,507	200,522
Telegraph, telephone and signalling apparatus	1,137,776	1,420,250
Radio loudspeakers	60,988	44,781
Telecommunication components, n.e.s.	512,050	301,845
Other telecommunication apparatus	144,984	77,739
Valves and cathode ray tubes	396,376	217,761
Carbons	27,144	23,376
Lamps, exceeding 24 V	106,709	64,820
Ditto, not exceeding 24 V	39,495	28,190
Other lighting appliances	361,082	294,905
Primary batteries	217,520	78,736
Parts other than carbons	32,303	20,323
Accumulators for motor vehicles	258,320	160,555
Ditto traction	13,877	11,075
Ditto radio	7,013	1,335
Other portable accumulators	87,265	37,992
All other accumulators	51,292	131,634
Parts and accessories	56,614	59,047
Cooking appliances	216,007	90,068
Heating appliances	93,925	51,567
Parts and accessories for cooking and heating appliances	60,826	39,034
Flat irons	87,521	37,866
Commercial electrical instruments	134,036	88,043
House service meters	106,573	109,897
Time recorders and time switches	31,664	15,624
Other electrical instruments	154,794	116,874
Electro-medical apparatus (not X-ray)	60,077	39,895
X-ray apparatus, tubes and parts	123,041	65,068
Permanent magnets	28,465	18,310
Insulating cloth and tape	109,520	82,838
Other insulating materials	114,664	90,001
Unclassified electrical goods and apparatus	513,894	407,103
TOTAL electrical goods and apparatus	8,483,946	6,706,386
Diesel driven generators not exceeding 200 kW•	415,694	835,041
Ditto, exceeding 200 kW•	342,278	141,007
Other generating sets•	86,771	207,959
Generators exported without prime movers, and parts of generators†	341,525	202,143
Motors, railway, tramway and trolley bus	9,822	23,744
Ditto, other, not over ½ h.p.	152,105	83,121
Ditto, over ½ h.p. but under 1 h.p.	60,844	40,459
Ditto, from 1 h.p. to 250 h.p.	453,217	456,407
Ditto, exceeding 250 h.p.	102,851	44,887
Ditto, parts	94,954	63,564
Converting machinery	28,147	11,662
Transformers, including coils	835,425	609,210
Rectifiers for power house use	59,202	17,022
Motor starting and controlling gear	194,999	193,447
Switchgear and switchboards (not telegraph and telephone)	1,007,824	939,000
TOTAL electrical machinery	4,185,658	3,868,673
Washing machines (not exceeding 250 lb weight)	529,230	340,767
Ditto, parts	22,889	27,835
Vacuum cleaners	295,806	202,429
Ditto, parts	52,415	23,566
Other electrically operated portable appliances and parts	169,139	72,661
Portable electric tools	94,861	85,587
Unspecified electrical machines, machinery and parts	303,563	69,722
GRAND TOTAL	14,137,537	11,397,626

• The 1950 figures include generators without prime movers

† The 1950 figures are for parts of generators only

£486,991 to £745,706, rivalled Australia which took £767,032 worth (£890,438) for the position of biggest buyer, South Africa being third in the list with £699,891 (£498,999). Details of purchases by other countries are given in Table II.

In the cable market Australia was the largest purchaser of telegraph and telephone cable other than submarine, while Malaya and British East Africa were the best markets for paper insulated and rubber insulated types respectively. Out of a total of £597,094 worth of commercial radio apparatus exported, Sweden (£138,541) took slightly more than India (£125,443). South Africa was the best customer for domestic radio equipment, taking £41,522 worth out of a total £413,507.

Australia (£245,337) bought nearly twice as much telegraph, telephone and signalling apparatus as the next biggest customer, India (£145,494) and South Africa (£140,255). The last-mentioned country bought £50,444 worth of accumulators, Malaya taking £25,977 and India £20,166 worth. Australia (£87,055) and the Irish Republic (£66,479) absorbed most of the £370,758 worth of cooking and heating appliances exported. The principle customers for electrical instruments were Australia (£49,993), India (£30,999) and the Netherlands (£25,034).

Though its purchases have fallen from £554,637 in May, 1950, to £195,652 last month, Russia has, somewhat surprisingly, almost resumed its position as the largest purchaser of generating plant. Only Australia (£198,198) took more. Australia (£121,770) was also the best market for motors, followed by South Africa (£101,848). The latter country received £374,798 of the £2,125,597 worth of "other electrical machinery," the next most important buyers of this class of product being India (£314,608) and Australia (£264,583).

Holland supplied electrical goods and apparatus to the value of £204,720 out of a total of £528,227 imported. The total, which compared with £403,656 for May, 1950, included £125,192 worth of valves and £147,595 worth of radio, telecommunication and electronic apparatus.

TABLE II.—Distribution of Electrical Goods and Apparatus

Destination	May, 1951	May, 1950
	£	£
Channel Islands	52,654	40,459
Gibraltar	5,522	46,933
Malta and Gozo	9,569	23,651
Cyprus	52,854	9,825
British West Africa	132,331	98,649
Union of South Africa ..	699,891	498,999
Northern Rhodesia	17,120	31,917
Southern Rhodesia	95,975	62,267
British East Africa	214,780	151,241
Bahrein, Kuwait, Qatar and Trucial Oman	23,224	46,888
India	745,706	486,991
Pakistan	249,969	140,178
Malaya	359,292	272,937
Ceylon	112,241	77,052
Hong Kong	342,483	91,721
Australia	767,032	890,438
New Zealand	164,038	412,177
Canada	183,747	180,246
British West Indies ..	112,031	77,488
Anglo-Egyptian Sudan ..	45,791	11,062
Other Commonwealth Countries	47,667	43,457
Irish Republic	460,596	290,954
Soviet Union	26,249	17,968
Finland	60,334	27,503
Sweden	349,055	227,006
Norway	171,357	128,143
Iceland	25,212	9,781
Denmark	149,142	155,351
Poland	37,559	72,893
Germany	40,999	28,227
Netherlands	333,932	290,089
Belgium	147,563	81,894
France	118,639	112,979
Switzerland	41,706	31,949
Portugal	100,105	107,600
Spain	20,541	25,201
Italy	64,868	65,099
Austria	74,277	36,596
Hungary	9,419	15,519
Czechoslovakia	4,566	4,520
Greece	64,645	59,217
Turkey	85,541	45,903
Indonesia	32,597	12,390
Portuguese East Africa ..	17,456	8,659
Syria	26,229	3,178
Lebanon	19,363	18,287
Israel	53,950	15,794
Egypt	190,757	267,752
Arabia	56,252	20,713
Iraq	72,502	36,192
Iran	159,106	108,851
Burma	52,723	47,105
Thailand	81,481	38,336
China	55,749	1,463
United States of America ..	110,429	34,755
Colombia	6,915	9,013
Venezuela	27,797	56,959
Peru	76,607	41,731
Chile	33,072	12,636
Brazil	233,798	140,442
Uruguay	34,336	17,629
Argentine Republic	150,026	226,960
Other Foreign Countries ..	172,579	58,573
Total ..	8,483,946	6,706,386

Export Licensing

THE Export of Goods (Control) Order, 1951 (S.I. 1951 No. 1053, price 1s 3d), which came into operation on 21st June, brings up to date the Consolidation Order, 1950, with all subsequent amendments. In addition one formal change is made: goods for which a licence to export has already been given under the recent Control of Goods (Import Certificates) Order, 1951, are no longer controlled under this Export Goods Order.

Commerce and Industry

Engineering Wages Demand

Control of Exports to China

RESOLUTIONS demanding higher wages for all engineering and shipbuilding manual workers and workers in the electricity supply industry were passed at the annual conference of the National Committee of the Amalgamated Engineering Union held at Brighton. The resolution affecting workers in the engineering and shipbuilding industries demanded an increase of £1 a week and proposed that the new consolidated rate should form the basis for calculating all piece work and bonus earnings, and that the piece-work rates be such as to enable piece-workers to earn at least 33⅓ per cent more than the new time rate. It also proposed that the increase should be operative from the date of the claim. It was decided that the claim should be presented through the Confederation of Shipbuilding and Engineering Unions.

The resolution relating to workers in the electricity supply industry condemned the recent wage increase of 1½d an hour as "totally inadequate," and the executive was instructed to apply for an increase in the rate by a further 1½d to 3s 6d an hour for skilled workers, with proportional increases for certain other employees.

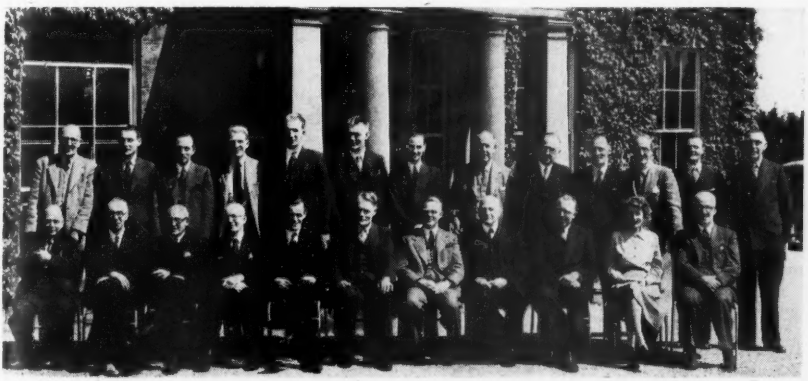
At last Friday's session the Government's refusal to introduce equal pay for women workers was severely criticized. A resolution was passed demanding an increase of £1 a week for women in the industry and the relation of their piece rates to time workers' rates.

Managerial Grades Agreement

The *Electrical Power Engineer* reports that at a meeting of representatives of the British Electricity Authority, the Electrical Power Engineers' Association, the National Association of Local Government Officers and the Association of Managerial Electrical Executive on 5th June settlement was reached on the final terms of the constitution of the National Joint Managerial and Higher Executive Grades Committee. Following the establishment of the new Managerial Board, negotiations will be entered into for an agreement covering terms of service and salary rates.

N.J.B. Negotiating Committee

The members of the National Joint Board Negotiating Committee paid a visit recently to the Yorkshire Area and were entertained by the Yorkshire Electricity Board, being received by



Members of the N.J.B. Negotiating Committee at the Scarcroft offices of the Yorkshire Electricity Board

Standing: Messrs. W. Ingledew, C. G. Hancock, S. S. Scott, E. Hanson, Gough, F. Lumby, W. Scott, J. N. Waite, Ald. A. Sturgess, O.B.E., H. O. Mayfield, G. O. Smith, W. J. Browning, J. Jones. *Seated:* Messrs. H. C. Waters, H. Midgley, G. W. Essex, E. J. Edgar, H. Norton, I. C. Williams, W. M. Lapper, Sir William Walker, J. L. Moss, Miss P. Dowdall and Mr. W. N. C. Clinch

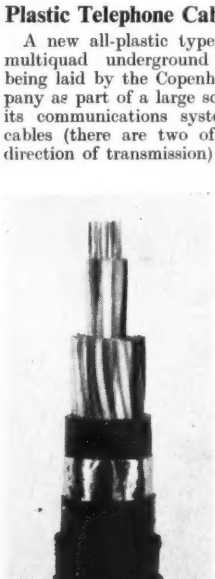
Mr. W. M. Lapper, chairman of the Board. During their stay in Yorkshire the members had time to have a look at the new television station at Holme Moss and afterwards toured the paper mill of B. S. W. Whiteley, Ltd., at Pool in Wharfedale. The accompanying picture was taken at Area headquarters, Scarcroft.

Steam Plant Company's Conference

A party of 400 employees from John Thompson, Ltd., Wolverhampton, attended a week-end conference at Pwllheli on 15th–17th June. The party consisted of directors, works managers, supervisors, and welfare committees together with their wives and families and also apprentices. Various supervisors attended from the works at Glasgow and Leeds. The conference was divided into three sessions, for supervisors, welfare committees and apprentices. Messrs. E. W. Thompson (chairman and joint managing director), J. Wilson Perry (joint managing director), E. Phillips (director), D. L. Murray (director and secretary), G. P. A. Thompson (director) and C. J. Carter (director, John Thompson Kennicott, Ltd.), addressed the various meetings.

Plastic Telephone Cables

A new all-plastic type of carrier frequency multiquad underground telephone cable is being laid by the Copenhagen Telephone Company as part of a large scheme of expansion of its communications system. These 12-quad cables (there are two of them, one for each direction of transmission) have been developed and manufactured by the Telegraph Construction & Maintenance Co., Ltd.



Section of 12-quad all-plastic communication cable showing "Telcothene" sheath which locks the quads in position

Instead of the normal paper insulation the cables are insulated and sheathed with "Telcothene," which is unaffected by water. They are designed to provide 48 speech channels per pair in a frequency band from 12 to 204 kc/s. Although it is steel tape armoured it is extremely light in weight and can be laid in about one fifth of the time it would take to lay lead covered paper insulated cable of the same size under similar conditions, thereby reducing installation costs. Due to the almost negligible losses in the dielectric at high frequencies it is likely that as development proceeds it will be possible to operate a larger number of communication channels per pair of wires than is the case with any other known cable.

Engineering Draughtsmen's Salaries

At a recent meeting of the National Joint Board for the Electricity Supply Industry a salary schedule for engineering draughtsmen was approved, with effect from 1st July, 1949. There are six grades with annual salaries as follows:—1, £875–£1,025; 2, £750–£875; 3, £700–£800; 4, £600–700; 5, £500–£600; and 6, £375–£500. Chief draughtsmen in charge of a generation construction and transmission drawing office at Headquarters or Division, the staff of which includes at least one section leader or senior draughtsman, come under grade 1 and other chief draughtsmen under grades 2, 3 or 4 according to degree of responsibility. Section leaders are in grades 3 or 4; senior draughtsmen in grades 4 or 5 and engineering draughtsmen in grade 6. As surveying work may include draughtsmanship, surveyors may be allocated to grades under this schedule according to responsibility.

The N.J.B. has also approved gradings for chemists appointed by Generating Divisions.

Welding Summer School

Some 220 students, including a few representatives from Holland, Belgium and Norway, attended the British Welding Research Association summer school on "Welding Design and Engineering" held recently at Ashorne Hill, near Leamington Spa. The very full syllabus kept the students busy from 10 a.m. to 10 p.m.; during the week there were no fewer than 63 lectures, seven discussions and eight hours of film displays. It has been decided to hold a similar function next year.

Chester Building Exhibition

At the Modern Building Exhibition which has been in progress since Friday last at Little Roodee, Chester, there is a plant manufacturers' section which includes a comprehensive display of plant for building. The exhibition has been organized by the Ministry of Works with the support of the building industry, Government Departments, technical colleges and other bodies concerned with building. Among electrical exhibitors are Crompton Parkinson, Ltd., who are showing Nelson stud welding equipment for automatic arc-welding of steel, alloy and non-ferrous studs and fittings to plates of similar material. Portable electric hand tools and portable generating sets are displayed by British Equipment Co., Ltd., and portable electric tools by Wolf Electric Tools and Black

& Decker are also shown by George H. Wright, Ltd. On the stand of Ni-Tubes, Ltd., there is a range of "Kopex" flexible conduit, while the Central Tool & Equipment Co., Ltd., is exhibiting the "Centec" high-speed portable electric router. The Merseyside and North Wales Electricity Board's display includes portable electric tools, examples of wiring systems, switchgear, a model house constructed in "Perspex," showing the layout of a modern hot water installation using solid fuel, supplemented by electric immersion heaters. The exhibition closes to-morrow (Saturday).

Infra-red drying plant for rum bottle caps

Warrington Trades Exhibition

An Industrial and Trades Exhibition will be held at Warrington from 11th to 21st July. One of the largest displays will be a wire and wire products stand on which the following companies have combined to make a comprehensive exhibit: British Ropes, Ltd.; British Wedge Wire Co., Ltd.; Firth Co., Ltd.; N. Greening & Sons, Ltd.; Greening Wire Co., Ltd.; Lockers (Wire Weavers), Ltd.; Lockers (Wire Workers), Ltd.; Longford Wire Co., Ltd.; William Robertson, Ltd.; Rylands Brothers, Ltd.; Sankey Green Wire Weaving Co., Ltd.; Peter Stubs, Ltd.; Whitecross Co., Ltd.

Lighting of Railway Coaches

The General Electric Co., Ltd., is supplying 12,056 shoulder light fittings and associated connecting sockets for new standard passenger coaches on British Railways. The fittings are die cast in a zinc-based alloy and finished matt chrome. Each incorporates a self-contained switch and local fuse.

Record Radio and Electrical Sales

Stimulated by disposals at pre-Budget prices, sales of "independent" radio and electrical retail shops reached a record level in April. According to the *Board of Trade Journal* sales were 97 per cent above those of April, 1950, and the increase during the first four months of this year as compared with the corresponding period of 1950 was 59 per cent. It is stated that sales of radio and electrical apparatus by the large-scale organizations rose to a much smaller extent.

Drying Viscose Bottle Caps

Infra-red lamp plant manufactured by the General Electric Co., Ltd., and installed in the premises of the proprietors of Hays Wharf, Ltd., is used to dry viscose caps on bottles of rum and also the gummed labels. The bottles are carried from the bottling department on a conveyor and pass through the 14ft long infra-red plant in 25 sec. They are then ready for packing. The plant consists of two vertical opposing rows of lamps mounted in concentrating reflectors which may be adjusted in height to deal with large or small bottles. The plant has a loading of 18 kW.

Guide to Building Organizations

The Building Centre, 9, Conduit Street, London, W.1, has issued a booklet giving details of the various societies and organizations which are directly or indirectly concerned with building. The first half deals with architecture, town planning, surveying and engineering, and the second half with the organizations of builders, trade unions, research associations, etc. Associations of manufacturers concerned largely with wage rates and price agreements are not included.

Watford Industrial Exhibition

The British Thomson-Houston Co., Ltd., supplied "Mazda" lamps and lighting fittings for the main hall and the Borough Council stand in the foyer at the recent Watford Industrial Exhibition. The installation was carried out by George R. Clay, Ltd., of Watford, and the average level of illumination on the exhibition stands was 55 lumens per sq ft. "Mazda" F1050 bare-lamp fittings were used throughout this section and were concealed behind pelmets to ensure glare-free lighting.

Suggestions Scheme

At an informal ceremony at Truro Mr. S. F. Steward, chairman of the South Western Electricity Board, recently presented a £10 cheque to Mr. J. A. Wright, assistant district engineer, Central Cornwall, under the Board's suggestions scheme. This scheme, launched last August in accordance with the recommendation of the National Joint Advisory Council, is designed to encourage suggestions for improving efficiency in any department of the

Board and is open to all employees. The suggestion which won this award concerned the melting and running off of the compound in sealing boxes. It has been recommended for adoption throughout the Board's area, and when it has been in operation for six months and if the experiment proves successful a further award may be made.

Trade with China

In the House of Commons on 19th June Sir Hartley Shawcross announced that the Government had decided to impose export licence control on all goods to be sent from the United Kingdom to China and Hong Kong, and an Order giving effect to this decision would come into operation on 25th June. It was not their intention to impose a total embargo on trade with China, and export licences for goods which were not considered to be of military or strategic importance to China would be granted freely, subject to availabilities and the prior claims on resources.

The list of items subject to embargo for China includes the following :—

Atomic energy materials and equipment; radar and other radiolocation equipment ; electronic devices designed or specially suitable for use in warfare; communication equipment including cables; valves and other components specially suitable for use in the above and machinery for making these valves and components; tissues for use in electrical apparatus; other materials having important applications in electronics; laboratory instruments of importance in research in such strategic fields as atomic energy; precision and scientific instruments capable of being used in the development, production and testing of military equipment; electric generators and motors; portable hand held power tools; welding machines and equipment (including electrodes); measuring and testing instruments and machines for use in engineering workshops.

Electric Iron Manufacture

To increase its output of electric irons Morphy-Richards, Ltd., is constructing a new plant having double the existing production capacity. The company is reverting to its pre-war practice of supplying irons having voltage ranges of 200/220 V and 225/250 V.

Steam Engine Company's Jubilee

A booklet commemorating the fiftieth anniversary of Ashworth Parker, Ltd., manufacturers of steam engines and generating sets, Bury, Lancs, outlines the history of the company, and contains illustrations of its products.

Dublin Dispute Settled

The dispute at the Pigeon House power station, Dublin, which had lasted ten weeks and lost the Electricity Supply Board 20 million kWh ended on 21st June when the 250 workers concerned decided to accept the offer of 1½d an hour wage increase for semi-skilled men. About 90 men have been up-graded from unskilled to semi-skilled status and will receive pay as such retrospective to 7th May. The men had refused to work overtime at the station and as a result a strict rationing scheme was imposed.

Price Adjustment Formulæ

The following are the latest figures for use in the B.E.A.M.A. contract price adjustment formulæ.—Rates of pay : The rate of pay for adult male labour at 16th June is deemed to be 120s. Cost of material: The Board of Trade index figure for intermediate products published on 16th June is 383·6 and is the figure for May.

Trade Announcements

Stewart Transformers, Ltd., have moved from Finchley Road to 75, Kilburn Lane, Kensal Rise, London, N.W.10.

The Elkay Electrical Manufacturing Co., Ltd., has appointed as its selling agents in New Zealand, Bradley's Electrical Co., Ltd., 57a, Victoria Street, Wellington, who are importers and distributors of electrical, electronic and household appliances.

Catalogues and Lists

Electromagnets, Ltd., Boxmag Works, Bond Street, Birmingham, 19.—Technical folder on electromagnetic clutches.

Sun Electrical Co., Ltd., 118-124, Charing Cross Road, London, W.C.2.—Priced and illustrated catalogue of desk, bracket and ceiling fans.

Thorn Electrical Industries, Ltd., 105/109, Judd Street, London, W.C.1.—Priced leaflet on "Atlas" cycle dynamo lamps and 5 W neon devotional lamps.

Simplex Electrical Co., Ltd., Broadwell, Oldbury, Birmingham.—Folder on "Creda" unit type heavy duty cooking equipment.

Sturtevant Engineering Co., Ltd., Southern House, Cannon Street, London, E.C.4.—Technical brochure on grain conveying and bin drying plant.

Prices of Materials

In the accompanying table we give the prices of the more important materials used in the electrical industry. The figures are those quoted on Monday last.

ALUMINIUM Ingots	ton £124 0s 0d
COPPER, H.C. Electro	ton £234 0s 0d
Fire Refined 99·7 per cent ..	ton £233 0s 0d
Fire Refined 99·2 per cent ..	ton £232 10s 0d
LEAD, English	ton £161 0s 0d
MERCURY	flask £73 10s 0d
TIN	ton £915 0s 0d
ZINC, G.O.B. Foreign	ton £160 0s 0d
Electrolytic	ton £164 0s 0d
BRASS Tubes	lb 2s 0¼d
Sheet	lb 2s 3¾d
Wire	lb 2s 6¼d
COPPER Tubes	lb 2s 2¾d
Sheet	ton £284 10s 0d
H.C. wire and strip	ton £261 15s 0d
PHOSPHOR BRONZE	
Wire	lb 3s 7¼d
RUBBER, No. 1 R.S.S. spot ..	lb 45d–45¾d

British Standards

A Measure of Industrial Progress

FOR the past two weeks the British Standards Institution has been celebrating its fiftieth anniversary in the field of industrial standardization and in the pooling and distribution of technical information. Apart from various social functions perhaps the most important and interesting item in the programme has been an exhibition at the Science Museum, South Kensington, London (18th to 28th June) which dealt very fully with the Institution's work. The exhibition was opened on Monday, 18th June, by Mr. George R. Strauss, Minister of Supply, in the presence of nearly 100 representatives of national standards bodies from 30 Commonwealth and foreign countries.

Value of Standardization

Describing the work of the B.S.I. as being largely carried on behind the scenes, Mr. Strauss said that British ideas on industrial standardization had provided a common pattern which had been adopted all over the world. Standardization did not mean dull and drab uniformity but a sensible reduction in the varieties of similar goods manufactured, so that labour and materials could be saved, output increased and the national standard of life raised. He laid special emphasis on the necessity for standardized equipment for the armed forces for whom quick replacement under difficult conditions was always necessary.

In conclusion he mentioned that 13,500 technically qualified people from every British industry served on the committees of the Institution to work out standards which makers and users voluntarily accepted. In many fields these British Standards were the contract basis for overseas trade.

The exhibition, the first of its kind, occupied about 15,000 sq ft and was arranged in such a way as to be truly representative of the vast range of industries directly or indirectly affected by standardization. Broadly speaking, it was a demonstration of the way in which British industry has both seen the need for, and applied, standards of materials, methods and test procedures, in order to improve manufacturing efficiency and thence to give buyers better products and services at the lowest possible prices.

Electrical Exhibits

The electrical industry was represented by the Cable Makers' Association, the Electric Lamp Manufacturers' Association, the British Electrical and Allied Manufacturers' Association, the British Electricity Authority, and the British Radio Equipment Manufacturers' Association. Since one of the earliest standards to be published dealt with cables (B.S.7: 1904 " Tables of Copper Conductors and Thicknesses of Dielectric ") it was fitting that the C.M.A. should have an exhibit extensive in scope. This covered three main groups of cables—for power and lighting, ships and welding, and collieries, mines and quarries, together with a variety of miscellaneous types.

On the stand of E.L.M.A., which was also responsible for the special lighting equipment used throughout the exhibition, there was a wide range of standard electric light sources, an enlarged model of a coiled-coil filament lamp, equipment for testing the suitability of tungsten wire for filaments and a demonstration of drilling diamond dies for the drawing of filaments.

One section of the B.E.A.M.A. exhibit dealt with electric welding applications, techniques and equipment while the other was concerned with electrical equipment and apparatus illustrative of over 300 B.S. specifications : installation accessories; domestic appliances; industrial equipment; and h.v. generation and transmission plant. The exhibit also illustrated the relationship between B.E.A.M.A., British Standards and international standards.

The B.E.A. stand explained how vital standards were in the highly organized electricity supply industry and included a sectional model of Staythorpe " A " generating station and an illuminated map of the British Isles showing how the grid system was built up and how it is operated. The

B.R.E.M.A. dealt with radio reception, while the B.B.C. concentrated on transmission and the G.P.O. gave an interesting series of demonstrations of radio and television interference and its suppression.

Although many of the exhibits had no direct electrical interest, they were shown to have an important influence on the electrical industry. For example, there were stands dealing with screw thread standardization, nuts and bolts, refrigeration, drawing office practice, packaging and gauges and tools. The most important types of raw materials—aluminium, copper, steel, lead, rubber and coal—were also dealt with.

On the occasion of the exhibition the B.S.I. published a most interesting and excellently produced 103-page book entitled "Fifty Years of British Standards."

On the day the exhibition was opened there was a Government reception at Lancaster House where Institution members and their guests from overseas were received by Sir Hartley Shawcross, President of the Board of Trade. On 20th June there was a banquet at the Guildhall. Speaking at this function in reply to a toast by Sir John Anderson, President of the B.S.I., Mr. Hugh Gaitskell, Chancellor of the Exchequer, announced the Government's acceptance of the recommendations contained in the Cunliffe Report on the B.S.I.

It will be remembered that the Cunliffe Committee recommended that until the end of the financial year 1951–52, the Government contribution should be a minimum of £90,000; that in the year 1952–53 it should be equal to the income from industrial subscriptions in the same year, and after that should be equal to the industrial subscriptions in the previous year, subject to an annual maximum of £150,000.

Other activities arranged for the foreign visitors included excursions to Hampton Court and Windsor Castle, a trip down the Thames by P.L.A. launch and a tour of the South Bank Exhibition. There was also a conversazione at the Natural History Museum, South Kensington, on 22nd June, which was attended by well over 2,000 Institution members and their guests.

I.E.S. Summer Meeting

The Illuminating Engineering Society announces that its next summer meeting will be held at Eastbourne from 20th–23rd May next year.

E.I.B.A. Golf

ARRANGEMENTS for this year's E.I.B.A. National Golf Competition are in full swing and the Areas have been realigned so as to coincide with the geographical areas of the Electricity Boards. Qualifying cards for the Area Finals may be obtained from any Area Secretary at 2s 6d per card.

The National Final this year will be a two day meeting at the Southport and Ainsdale Golf Club, on Monday and Tuesday, 24th and 25th September.

Monday will be devoted to the Visitors' Trophy and Veterans' Trophy Competition, Tuesday to the National Final proper. It is hoped to make this Final the outstanding golfing event of the year in the electrical industry, and a target of £1,000 has been set for 1951. This competition deserves the support of all our golfing readers.

Any information regarding Area Secretaries, etc., may be obtained on application to the National Honorary Secretary, Mr. W. J. Bird, Magnet House, Kingsway, London, W.C.2.

Progress of Erne Scheme

THE total output of the Erne hydro-electric scheme in Ireland, when completed, will be 200 million kWh annually. The work commenced in 1945 and 600 men are at present employed on the project. Until water storage is available, production, even with full plant, will be approximately 150 million kWh. The first of two 22,500 kW generators being installed at Cathaleen's Falls near Ballyshannon is expected to be functioning next November, and the second next summer. The Cliff station, near Belleek (capacity 10,000 kW) began to generate last winter but water shortage since March has rendered its operation intermittent. The water storage scheme in process of development will involve the enlargement of existing channels between Upper and Lower Lough Erne as well as between the lower lake and Cliff station.

Students' Tour

TWENTY members of the Students' Sections of the Institution of Electrical Engineers will be leaving by air tomorrow (Saturday) to take part in a tour of France from 30th June to 15th July. The programme, which has been arranged by M. Laborde, Electricité de France, in collaboration with the Office du Tourisme Universitaire, will include visits to a number of places of interest. The members will be the guests at luncheon of the Société Française des Electriciens on 2nd July.

Customs Tariff Nomenclature

Steps Towards a Universal Classification

By JOHN C. HANCOCK

ELECTRICAL exporters, with only a slight knowledge of overseas customs tariffs, will have found a striking lack of uniformity between the tariffs of different countries. The sending of a simple appliance or piece of apparatus overseas discloses a surprising variety of customs descriptions under which the article could be classified.

In the case of electric irons the exporter might find that in one country they would enter as manufactures mainly of iron and steel. Another country might classify them as household goods while yet another might group them, more appropriately, under the heading of electrical goods.

Existing Inconsistencies

Casting stones at the inconsistencies of other countries' tariffs must not blind us to the complexities which exist in our own tariff glasshouse. An electrical importer interested in accumulators, for instance, would find that the United Kingdom provides for them under two different sections of the tariff, namely group X and group XVII depending on whether they are for motor vehicles or otherwise. Again, if he wished to import an electrical instrument of some kind he could never be quite certain whether it would be liable to Key Industry Duty or chargeable under some other section of the tariff.

Having established the appropriate customs classification for their various goods exporters are faced with yet another difficulty—the question of customs valuation. Some countries levy duty on the c.i.f. value—others on the f.o.b. value or home consumption value in the country of exportation.

Quite independently of the Torquay tariff talks a group of experts from many countries has been working to achieve a standard international customs procedure. This body, known as the European Customs Union Study Group, after three years' work in Brussels, has recently produced its first major result, namely conventions providing for: (i) The adoption of a standard classification of goods for customs purposes. (ii) The adoption of a common definition of value of imported goods on which customs duties are levied.

A further convention establishing a Customs Co-operation Council sets up a technical body to supervise the application of these two conventions. This council is now drawing up a set of notes on the nomenclature and rules for the uniform interpretation and application of the conventions generally.

Signed in Brussels by the United Kingdom and six other European countries—Belgium, France, Greece, Iceland, Italy and The Netherlands—the conventions still await ratification by the Governments concerned. The conventions are not confined to the European Governments who are members of the study group but may be adopted by any government.

The " Convention on the Classification of Goods in Customs Tariffs " will do much to " simplify and rationalize the mechanics of international trade." The benefit of a common classification, or nomenclature, is that any given article will appear in the same chapter, and under the same heading, in each country's tariff although this does not mean that it would be subject to the same rate of duty. The United Kingdom tariff in particular would be purged of such an inconsistency whereby a commodity may be chargeable for duty under two, or even more, different sections.

League Committee's Specification

The idea of a standard classification of goods for customs purposes is not new. In 1927 a sub-committee of experts was appointed by the League of Nations Economic Committee to draft a model specification for universal adoption. Exactly ten years later this specification was adopted by the League. This ready-made nomenclature simplified the work of the present study group.

Several countries have already based their tariffs on the League of Nations model, among these being France, Finland, Italy and the Benelux Customs Union, as well as Colombia and Uruguay, so that for them to adopt the Brussels nomenclature involves little change in the framework of their present tariffs. For other countries the adoption of this nomenclature will mean that in most instances existing tariffs will have to be re-drafted. Although it has been stated that "some years" must elapse before even the United Kingdom tariff can be adapted to the standard classification the Board of Trade does not expect this to take longer than two or three years at the most.

The Brussels nomenclature comprises 9 chapters—ranging from live animals in Chapter 1 to antiques and works of art in Chapter 99. Each chapter is divided into certain main headings which all accedin countries undertake to follow, but each country is free to sub-divide within these agreed headings to provide for any specia rates of duty laid down in its own tariff.

Electrical goods fall into Chapter 85. This is divided into twenty-eight agreed main headings (set out below) which will be common to all countries' tariffs, though

CHAPTER 85.—ELECTRICAL MACHINERY AND EQUIPMENT AND PARTS THEREOF

Tariff Number	*Description of Goods*
85–01	Electric generators, motors, transformers, convertors (rotary or static), rectifiers, inductors, reactors, frequency transformers, and similar machinery and apparatus, other than goods falling within headings Nos. 85–08, 85–09 or 85–21.
85–02	Electric magnets and electro-magnet operated appliances (for example metal extractors, brakes, clutches and chucks); permanent magnets.
85–03	Primary cells and primary batteries.
85–04	Electric accumulators.
85–05	Portable electro-mechanical tools adapted for working in the hand.
85–06	Electro-mechanical domestic appliances.
85–07	Electric shavers and hair clippers.
85–08	Electrical starting and ignition equipment for internal combustion engines (including ignition magnetos, dynamo-magnetos, ignition coils, starter motors and dynamos), sparking plugs and glow plugs.
85–09	Electrical lighting and signalling equipment, and windscreen wipers and defrosters, for cycles and motor vehicles.
85–10	Electro-thermic apparatus (including electric furnaces and electric welding machines and apparatus).
85–11	Portable electric battery and magneto lamps, other than lamps falling within heading No. 85–09.
85–12	Radiological apparatus, including X-ray tubes and screens.
85–13	Electrical line telephonic and telegraphic apparatus (including such apparatus for carrier-current line systems).
85–14	Microphones and loudspeakers; electric amplifiers.
85–15	Radiotelegraphic, radiotelephonic and television transmitters and receivers (including radiogramophones and television cameras); radio navigational aid equipment; supersonic or electro-magnetic echo sounding apparatus.
85–16	Electrically operated equipment for controlling or signalling to road, rail and other vehicles (including railway signals and point remote controls).
85–17	Electric bells and indicators of a kind suitable for domestic, office or factory use; electric burglar or fire alarms.
85–18	Electrical condensers, fixed or variable.
85–19	Electric current controlling, regulating and distributing apparatus (for example switches, fuses, junction boxes, plugs and sockets, rheostats, thermostats, switchboards and control panels); resistances, other than heating elements and barretters.
85–20	Electric lighting lamps and tubes and arc lamps.
85–21	Thermionic or electronic tubes and valves, cathode-ray tubes, photo-electric cells (vacuum or gas-filled types), barretters and crystal diodes and triodes.
85–22	Electrical goods and apparatus not falling within any other heading of this chapter.
85–23	Electrically insulated wire and cable (including enamelled or anodized wire), whether or not fitted with connectors.
85–24	Carbon of a kind used for the manufacture of electrical brushes, in blocks, plates and bars; arc lamp carbons, battery carbons, microphone carbons, carbon electrodes, carbon brushes and other electrical carbons.
85–25	Insulators of any material.
85–26	Fittings for electrical machinery, appliances or equipment, of insulating material, not being insulators falling within heading No. 85–25.
85–27	Electrical conduit tubing and joints therefor, insulated or of any insulating material other than rubber and artificial plastic material.
85–28	Electrical parts of electrical machinery, not being goods falling within any of the preceding headings in this chapter.

different countries may wish to sub-divide any heading to meet their individual needs. Whatever sub-divisions are made exporters and importers alike will know with certainty under which chapter and item number an article will be classified.

That the British Government are taking this question of standardization in all seriousness is evident from the fact that the United Kingdom schedule of concessions made under the Torquay tariff negotiations is presented both in terms of the existing tariff and also on the style of the Brussels nomenclature. Further, a proviso is inserted to the effect that should the United Kingdom formally adopt the Brussels nomenclature during the currency of the present G.A.T.T. agreements the former shall be replaced by the new nomenclature version.

So far as the United Kingdom is concerned the "common definition of value of imported goods" is substantially the same as the present one, which has been in existence since 1935 as defined in Section 10 of the Finance Act for that year. This definition of value, new to some countries, is expected to be introduced among all acceding countries before the end of 1951.

Briefly, the valuation for levying duties will be based on the c.i.f. value at the port or place of introduction into the country of importation, the seller being responsible for all costs, charges and expenses incidental to the sale and delivery of the goods at that port or place. The buyer will pay any duties or taxes applicable in the country of importation.

In those instances where importing countries levy duty on a f.o.b. or h.c.v. basis in the country of exportation the value for duty purposes under the new c.i.f. definition will, of course, be raised, and this will result in a corresponding increase in the duty payable. No individual country will find itself at a disadvantage, however, since these slight increases will apply to all exporting countries.

TRADE MARK APPLICATIONS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to the dates stated:—

6th July

DYNAPOISE. No. 688,993. Class 9. Electrical apparatus included in Class 9.—Foxboro-Yoxall, Ltd., Lombard Road, Morden Road, Merton, London, S.W.19.

A. MACKIE (design). No. 692,045. Class 9. Electrical apparatus and instruments included in Class 9; and scientific apparatus and instruments.—A. G. R. Mackie, trading as A. Mackie, 9, St. Peters Square, Hammersmith, London, W.6.

PAL (design). No. 678,990. Class 9. Electric safety fuses and cut-outs, wireless receiving apparatus and wireless aerials, radar apparatus, rectifiers, switches, circuit breakers, switchboards (complete), switch boxes, ammeters, voltmeters, convertors, relays, etc., and parts included in Class 9. PAL (design). No. 678,991. Class 11. Electric lighting apparatus and installations for land vehicles, aircraft and airports, etc. — Pal, Spojené Závody Pomocného Automobilního a Leteckého Průmyslu, Národní Podnik, České Budějovice, Czechoslovakia. Address for service c/o Reddie & Grose, 6, Bream's Buildings, London, E.C.4.

BEAUTIFLOR. No. B692,360. Class 9. Electric floor polishing machines for domestic use.—S. G. Johnson & Son, Inc., Racine, Wisconsin, U.S.A. Address for service c/o Haseltine Lake & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

No. 696,516 (design). Class 9. Electromagnetic relays. —Servo-Contact, Paris, France. Address for service c/o F. J. Cleveland & Co., 29, Southampton Buildings, Chancery Lane, London, W.C.2.

NOMOTRON. No. 697,645. Class 9. Electric discharge tubes (not for lighting purposes).—Standard Telephones & Cables, Ltd., Connaught House, 63, Aldwych, London, W.C.2.

LIBAR. No. 697,908. Class 9. Electrodes for measuring the electrical potential of a solution.—Electronic Instruments, Ltd., 17, Paradise Road, Richmond, Surrey.

DYNAMAX. No. 697,124. Class 10. X-ray tubes and housings therefor. Machlett Laboratories, Inc., Springdale, Fairfield County, Connecticut, U.S.A. Address for service c/o Cruickshank & Fairweather, 29, Southampton Buildings, Chancery Lane, London, W.C.2.

13th July

No. 696,442 (design). Class 7. Electrical generating sets and electric washing machines. No. 696,437. Class 9. Electric vacuum cleaners. No. 696,438 (design). Class 11. Refrigerators and fluorescent lighting fittings included in Class 11.—Frank Lewis & Co. (Export), Ltd., 65, St. Paul's Churchyard, London, E.C.4.

STATICON. No. B697,614. Class 7. Electricity alternators, generators and dynamos, parts and fittings included in Class 7.—Brush Electrical Engineering Co., Ltd., Falcon Works, Nottingham Road, Loughborough, Leics.

ELLIOTTEL. No. 697,658. Class 9. Electrical apparatus and instruments; scientific, nautical, surveying, wireless, weighing, measuring, signalling and checking (supervision) apparatus and instruments; and calculating machines.—Elliott Brothers (London), Ltd., Century Works, Lewisham, London, S.E.13.

FLAREMASTER. No. B695,942. Class 11. Electric torches and portable electric lamps; lamps for motor vehicles and parts (included in Class 11) of such lamps; and vehicle reflectors and anti-dazzle devices for motor vehicle lamps.—Notek Electric Co., Ltd., 23, London Road, Bromley, Kent.

TWINLAY. No. B694,455. Class 17. Insulating and identification sleeves made of polyvinyl chloride plastics for electrical purposes.—Hellermann Electric, Ltd., Tinsley Lane, Crawley, Sussex.

ELECTRICITY SUPPLY

Installations in L.C.C. Houses

Short Wave Radio Experiments

BEFORE the war electric lighting was being installed in place of gas in a number of houses and flats on the London County Council's estates and since the war similar conversions have been authorized at a number of estates. The L.C.C. Housing Committee now proposes that the remaining 1,025 dwellings at 22 estates (excluding Millbank estate) shall be converted at an estimated cost of £45,385. Most of this work will be done in the year 1951–52 and the rest in the following year. Many of these older dwellings will eventually be modernized, but as this will not be done within the next four years the Committee does not consider that the replacement of the obsolescent gas lighting by electric lighting should be delayed until the structural modernization work is carried out. Millbank estate is excluded from the present scheme as it is one of the first estates to be dealt with under the modernization programme.

Wick Diesel Plant

In a White Paper published recently particulars are given of a Constructional Scheme (No. 59) promoted by the North of Scotland Hydro-Electric Board which has been approved by the Secretary of State for Scotland. The Scheme provides for the construction of a diesel generating station at Wick (capacity about 3,600 kW) to meet the growing demand for electricity in Caithness. The estimated cost is £157,120.

Ayrshire Reinforcement

The South West Scotland Electricity Board has approved two schemes for reinforcing the electricity network in the Ayrshire towns of Irvine and Largs. These schemes will give an improved supply to existing consumers and will enable the Board to meet the increasing demands being made on the electricity systems in these districts. The total cost will be approximately £51,000.

Route of Transmission Line

Addressing a meeting of the Ramblers' Association at Blanchland, Northumberland, the Home Secretary (Mr. J. Chuter Ede) referred to the plan for an extra-high-voltage grid line from Newcastle-on-Tyne to the Pennines. He said that efforts were being made to find an alternative route for the line which might possibly run close to the Roman Wall and thus injure one of the most inspiring views in the country. The matter was being gone into by the British Electricity Authority and the National Parks Commission and although alternative routes were not numerous he hoped some means of extending the electricity supply without injuring the land would be found.

Ripple Control for Leeds

An order has been placed by the Yorkshire Electricity Board Sub-Area No. 4, with Automatic Telephone & Electric Co., Ltd., for the supply of "Rythmatic" ripple control equipment to cover the Leeds area. The Leeds City Council Lighting Department is contracting with the Board for the provision of signal injection equipment at an agreed sum per lighting point. The relays, of which 5,000 are expected to be commissioned during the first year, will be purchased by the Council direct. Centralized control of all the equipment will be exercised from the office of the city lighting engineer, Mr. L. A. Doxey. The scheme, when completed, will be the most extensive ripple control installation in the British Isles.

Short Wave Radio Scheme

The North Western Electricity Board is to install short wave radio equipment in various parts of its Area, as a means of improving service to the consumer. The main use of this equipment will be to provide links between District headquarters and working parties in outlying areas, and it will be particularly effective in isolated rural communities. Under the scheme, system faults will be cleared more quickly than is possible with normal communications. It will permit engineers to be directed to breakdowns and to call for replacements with a minimum of delay and will enable savings to be made in any operations related to fault repairs.

The first experimental installation was made in the Macclesfield area and has shown gratifying results. It has been found particularly useful in gale conditions, when storms have brought faults and disrupted normal communications.

Other uses for the equipment may be found and experiments are in progress to see if it will be possible to employ it to assist speedy load shedding and restoration and for use in certain

consumers' premises as a means of intimating that a cut is imminent. It is unlikely, however, in view of the time taken to secure equipment and gain agreement on transmitter sites, that this type of service will be a possibility during the coming winter.

Bromborough Power Station

One of the four turbo-generators at the new Bromborough (Cheshire) power station was started up for the first time on 21st June, thus beginning the test of the initial section of the scheme. It will probably be early autumn before the plant comes into operation on the grid system. Work started on the site five years ago and it is estimated that the station will cost about £12,000,000.

New Johannesburg Station

Johannesburg City Council is applying to the Administrator of the Transvaal for sanction to borrow £6,351,000 for the first stage of a new power station at Lombardy, with an additional £577,000 to meet the anticipated increase in costs between the preparation of estimates and the placing of the orders. This initial stage is expected to be ready to meet the winter load in 1957 and it is proposed that the second part shall be put in hand not later than the end of 1955. A report by the City Tramway and Lighting Committee envisages a total capital expenditure on electrical development in the decade 1951–61 of £34,674,000.

Indian Commissions Amalgamated

The Central Electricity Commission and the Central Water-power, Irrigation and Navigation Commission in India have been amalgamated to form the Central Water and Power Commission. Its functions include general responsibility for initiating, co-ordinating and furthering the control, conservation and utilization of water resources throughout the country for flood control, irrigation, navigation and water-power generation. It will also deal with thermal power schemes and the transmission and utilization of electricity throughout the country; review and lay down standard voltages for the whole of India; and arrange for the training of engineers. The commission is composed of five members.

Estate Supply Terms

Durham Urban District Councils' Association is obtaining the views of its members regarding terms for electricity supplies to new housing estates. Seaham U.D.C. has decided to support the following proposals:—Substation sites to be sold outright to the North Eastern Electricity Board and not rented; the Board to pay interest on the cost of the land upon which approach roads are constructed; fencing of approach roads to be left for settlement between the Board and the local authorities; the Board to provide cable ducts at its own expense across carriageways, the installation of the ducts to be carried out by the local authorities at their cost provided the Board supplies the ducts and information as to where they are to be placed before the road is constructed. It is proposed to continue the present practice whereby the Board supplies and lays branch service cables up to and inside houses, the local authorities to provide ducts inside the houses and through the outer wall. The Council recommends that negotiations shall be opened with the Board for the suppression of noise from substations.

Cape Town Expansion

Commenting on the fact that annual sales of the Cape Town electricity undertaking more than doubled in the period 1939–49, the city electrical engineer says that this gratifying expansion has not been met without difficulty. Whereas before the war development took place in two or three areas within easy reach, new consumers are now being connected largely in outlying areas. In contrast to the 100·5 per cent increase in sales (from 237·6 million to 476·4 million kWh) the number of employees rose by only 7·6 per cent (a recommendation to add to the staff to ease the situation was subsequently approved). At the end of 1949 the installed plant capacity of the pooled power stations was as follows: Table Bay, 160,000 kW; Dock Road, 28,500 kW; and Salt River, 90,000 kW; a total of 278,500 kW. Output in 1949 was 811·5 million kWh against 741·7 million in the previous year, the thermal efficiency of the three stations being 24·1, 17·4 and 11·3 per cent, respectively.

Walsall Transport Finances

The West Midlands Traffic Authority has approved an application by the Corporation for a general increase in fares on the motor-bus services—but not on trolley-buses—administered by the Transport Department. In support of the application, Mrs. D. H. Charlesworth, borough treasurer, told the Court that there was a loss on the motor-bus services for the last year for which the accounts were completed of £39,405. Trolley-buses in that year, however, made a profit of £6,407. In the year ended March last it was estimated there would be a loss of £55,055 on motor-buses offset by a profit of £7,500 on trolley-buses.

Installations in Council Houses

Sunderland Town Council is considering the installation of electricity in Council houses on the Marley Pots estate at Southwick. The cost is estimated at £30,000. The North Eastern Electricity Board has stated that the work cannot be given priority as the houses have alternative means of lighting.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

Reports and Dividends

Associated Electrical Industries, Ltd.—At the time of the annual general meeting the directors announced their intention of submitting to the stockholders proposals for the conversion of 8 per cent preference stock into 4½ per cent preference stock, and the issue of further ordinary and 4½ per cent preference shares. Details of procedure having now been settled, the directors announce that a letter setting out in detail the board's proposals will be posted to all stockholders on 3rd July, together with notices of separate meetings of the preference and ordinary stockholders and of an extraordinary general meeting, all to be held on 27th July.

Pye, Ltd., reports a group profit for the year ended 31st March last of £543,149, as compared with £400,859 for 1949-50. Taxation required £353,956. The profit attributable to the holding company is £539,469 (against £400,749). Employees receive £32,000 under the profit sharing scheme, and the deferred dividend reserve receives £32,000. It is proposed to pay a final dividend of 3 per cent and a participating dividend of 2 per cent on the participating preferred ordinary stock, making 10 per cent for the year (unchanged). On the deferred ordinary the dividend is 12½ per cent, plus 5½ per cent from dividend reserve, making 18 per cent on the capital as doubled by the bonus issue. For 1949-50, on smaller capital, the total distribution was 35 per cent, consisting of 25 per cent, plus 10 per cent out of dividend reserve.

Pye (Ireland), Ltd., reports a trading profit for the year ended 31st March last of £62,950, as compared with £48,774 for the preceding year After deducting £24,300 for taxation, it is proposed to pay a final ordinary dividend of 7½ per cent, plus a bonus of 2½ per cent, making 12½ per cent for the year on increased capital. For the previous year the distribution on smaller capital was 20 per cent.

The British Electric Traction Co., Ltd., reports a group net profit for the year ended 31st March last, after providing £850,804 for taxation, of £1,211,426, as compared with £1,350,266 for 1949-50. The net profit of the parent company is £639,247 (against £638,031). It is proposed to pay a final dividend on the deferred ordinary stock of 17½ per cent, making 25 per cent for the year, and a final dividend of 17½ per cent, making 25 per cent for the year on the "A" deferred ordinary stock issued as a 200 per cent bonus to deferred stockholders in December, 1949. The deferred dividends paid for 1949-50 were, in the aggregate, equivalent to 22½ per cent on the total deferred stocks in issue at 31st March, 1950. The balance carried forward is £235,9[illegible] (against £254,748 brought in).

The Hackbridge & Hewittic Electric Co., Ltd., reports a group trading profit, subject to audit, of £379,331 for the year ended 31st March last, as compared with £339,899 for the previous year. After providing for depreciation and fees and £196,150 for taxation, the net profit is £142,720 (against £135,016). It is proposed to place £80,000 to general reserve and to pay a final ordinary dividend of 13 per cent (against 11 per cent), making 18 per cent for the year (15 per cent). The balance to be carried forward is £39,466 (against £37,491 brought in).

Mirrlees, Watson & Co., Ltd., record a group profit of £112,575 for the year ended 31st March. This compares with £98,717 and is arrived at after providing £162,211 (£94,278) for taxation. General reserve receives £50,000 (£45,000) and a dividend of 12½ per cent is to be paid on the £500,000 ordinary capital compared with 8 per cent on £466,000 capital in the previous year. The carry-forward is increased from £18,148 to £25,043.

Associated Insulation Products, Ltd., report that, after providing for all charges including £236,593 taxation (£137,177 in 1949), the group profit for 1950 was £387,851 (£161,093). The amount of the group profit attributable to the parent company was £244,185 (£91,640). Dividends of 20 per cent already paid (16 per cent) take £48,574 (£40,136).

Murphy Radio, Ltd.—In a circulated statement at the annual general meeting on 18th June, Mr. E. J. Power, chairman and managing director, said that the progress of the parent company had been well maintained, both the turnover and the profit exceeding expectations and constituting records.

Aron Electricity Meter, Ltd., reports a net profit for the twelve months ended 31st March amounting to £86,523, as compared with £59,554 in the previous year. Taxation absorbed £49,510 (£35,078) and £8,680 (nil) was written off investments, while £7,846

£4,847) surplus tax provision was added. A sum of £18,000 (£15,120) goes to reserves and a dividend of 15 per cent (same) is to be paid, leaving £34,811 (£28,597) to be carried forward.

Walsall Conduits, Ltd., reports a group trading profit for 1950, before taxation, of £396,004 (£313,590). Tax takes £176,983 (£166,009), leaving £219,021 (£147,581). A final ordinary dividend of 35 per cent and a bonus of 15 per cent again make 70 per cent and £483,638 (£347,933) is carried forward.

The Rheostatic Co., Ltd., proposes to issue 60,000 6 per cent 10s preference units to existing preference holders on a three-for-eight basis, and 245,000 4s ordinary units in the proportion of one for every three ordinary held. The proposals will be submitted at a meeting to be held on 9th July.

The Revo Electric Co., Ltd., reports a profit for 1950-51, after all charges including taxation, of £121,763, as compared with £113,719 for the preceding year. It is proposed to pay a final dividend of 12½ per cent, plus a bonus of 10 per cent, maintaining the distribution for the year at 27½ per cent.

Greenwood & Batley, Ltd., propose to pay a final dividend of 10 per cent, again making 15 per cent for the year.

Marco Refrigerators, Ltd., have declared an unchanged interim dividend of 7½ per cent.

New Companies

Dartford Electrical Co., Ltd.—Registered 25th May. Capital £1,000. Manufacturers and repairers of and dealers in dynamos, motors, armatures, etc. Directors: H. H. Bowyer and Mrs. Barbara S. Bowyer, both of 55, Tredegar Road, Wilmington, Kent.

A. Lowrey Ayre & Co., Ltd.—Registered 16th June. Capital £4,000. To acquire the business carried on by A. L. Ayre as Radex, at 91, Chester Road, New Oscott, Sutton Coldfield, and to carry on the business of manufacturers of and dealers in electrical goods of all kinds, television and wireless sets, etc. Directors: A. L. Ayre and Mrs. Grace A. Ayre. Regd. office: 91, Chester Road, New Oscott, Sutton Coldfield.

George Baker (Electrical) Co., Ltd.—Registered in Edinburgh 22nd March. Capital £2,000. Wholesale and retail electrical factors, etc. Directors: G. W. Baker, G. Baker and J. Baker. Regd. office: 135, Buchanan Street, Glasgow, C.1.

S. Richard & Co. (Liverpool), Ltd.—Registered 31st March. Capital £4,000. Wireless, television, telephonic and telegraphic engineers, electrical and mechanical engineers, etc. Directors: S. Richard and Annie Richard. Secretary: T. A. Sellars. Regd. office: 7a, The Temple, Dale Street, Liverpool.

Lowacost (Light), Ltd.—Registered 9th June. Capital £1,000. Lighting, electrical, wireless and general engineers, etc. A. Bieber is the first director. Regd. office: Offices of Alfred Bieber & Bieber, 1, Broad Street Place, E.C.2.

Butcher & Son (Electrical), Ltd.—Registered 14th June. Capital £5,000. Electrical engineers and contractors, etc. Directors: S. G. Hopkins, Mrs. B. I. Hopkins and J. G. Shergold. Secretary: Mrs. B. I. Hopkins. Regd. office: 81, High Street, Dunmow, Essex.

T.V. Servicing (Taunton), Ltd.—Registered 14th June. Capital £1,000. Manufacturers, repairers, hirers and dealers in electrical and mechanical apparatus and accessories, in particular wireless and television sets, etc. Directors: S. S. Day, J. James and A. W. Bird. Secretary: A. F. Roberts. Regd. office: 31, High Street, Taunton.

Manifold Electric Co., Ltd.—Registered 15th June. Capital £1,000. Electrical engineers and general electrical installation contractors, etc. A. C. Howeson is the first director. Regd. office: Town Hall Chambers, Uckfield, Sussex.

Increase of Capital

Johnson & Phillips, Ltd.—Increased by £1,916,250 in 1,250,000 4½ per cent cumulative redeemable preference and 666,250 ordinary shares of £1 each, beyond the registered capital of £1,333,750.

Meeting of Creditors

British Electric Co. (BECO), Ltd.—A meeting of creditors is to be held at the offices of Latham & Co., 185-188, High Holborn, London, W.C.1, today (Friday).

Liquidations

Manton's Electrics, Ltd., electrical engineers, 1, Copse Road, Cobham, Surrey.—Liquidator, Mr. J. Berliand, Burwood Oak, Burwood Park, Walton-on-Thames, appointed 14th June. Claims by today (Friday).

Herbert H. Barratt, Ltd.—Winding up voluntarily. Liquidator, Mr. T. F. Whitby, 1, Waterloo Street, Birmingham.

Barking Electrical Co., Ltd.—Particulars of claims by 16th July to the liquidator, Mr. N. W. Osborne, 11-12, Finsbury Square, London, E.C.2.

Bankruptcy

S. Edmondson, electrical dealer and contractor, carrying on business at Main Street, Milnthorpe, under the style of E. & B. Radio.—Receiving order made 18th June on debtor's own petition.

STOCKS and SHARES

IN the first part of the week Stock Exchange markets developed a decidedly better tone, on the reported Russian suggestion of an armistice in Korea. This had the effect of putting up prices of British Government stocks sharply and for a time the gilt-edged section looked unusually firm. Later on, however, a little selling took place and prices lost part of their first gains. In the commercial and industrial departments, the possibility of peace in Korea produced little change in prices. Investment continues to go to work cautiously. The ever increasing evidence of shortages induces the element of uncertainty into company earnings and distributions. Nor is this lessened by the Government's threat of a possibly more drastic application of the previous policy of dividend restriction.

Price Changes

The majority of price changes since a week ago are in the downward direction. The threatening Persian position led to withdrawal of support even from some of the shares which recently had been in high favour. Over the various commercial and industrial sections, the decline was fairly general. Falls of about 2s 6d left Chlorides at 73s 9d, English Electric at 70s, Lucas at 43s 9d and Reyrolle at 93s 9d. Automatic Telephone at 73s 9d lost $\frac{1}{16}$. Falls of 1s 6d lowered Ever Ready to 31s, Babcock & Wilcox to 80s 9d. Most of the other declines range from 6d to 1s 3d. On the other hand, Allen West at 12s 6d are a shade better. Midland Electrics hardened to 65s and Vactric to 13s 9d.

To illustrate the nature of the reaction in industrial markets, note may be taken that only three weeks ago G.E.C. ordinary jumped 4s in a day to 97s 6d, and inside of another week were within pence of the £5 mark. By the beginning of this week profit-taking had returned the price to 94s 6d. Similarly, A.E.I. ordinary were back to 95s, having also been practically £5 about a fortnight before. C. A. Parsons had changed hands up to 115s before reacting to 105s.

Conduits and Meters

Both Walsall Conduits and Aron Electricity Meter are paying the same dividend rates as for last year, but with an appreciably larger surplus to spare. Walsall Conduits' 70 per cent distribution appears to take barely a quarter of the net amount available. Consequent additions to reserves will bring these to a total calculated to encourage the capital bonus expectations which the market has been tentatively entertaining. Aron Meter's trading profit is more than 40 per cent up on the previous year's. At 43s 6d the £1 shares show nearly 7 per cent on the 15 per cent payment. On Walsall Conduits 4s ordinary at 62s 6d the return is 4½ per cent.

Dividend News

Hackbridge and Hewittic Electric's increase in the final dividend, making a total of 18 per cent for the year, came up to anticipations encouraged earlier by the raising of the interim payment. There was little change in the price of the 5s ordinary shares which, at 17s 9d, now give a little over 5 per cent on the money. Revo Electric 10s ordinary were marked up to 47s 6d on the decision to maintain the distribution at 27½ per cent, and on the disclosure of a 20 per cent increase in trading profits: this reverses the trend of the two previous years, and provides a more than two-fold cover for the dividends. The yield in this case is 5¾ per cent.

Pye Results

Pye 5s deferred shares came back 1s, to 22s 6d, after last week's dividend declaration. The movement would seem attributable largely to general tendencies, for the payment was little below market expectations, and the expansion in group trading profits by more than a third was well received. At a total of 18 per cent, which includes 5 per cent from the dividend reserve, the distribution represents a fraction more than the 35 per cent paid last time on half the present capital. Yield on the shares works out now at 4 per cent. It is interesting to note that in a Parliamentary debate on the same day as the Pye announcement, the Ministry of Supply was stated to have placed defence orders with the radio industry to the value of £50 million.

Five Per Cent

With irredeemable Government securities now on a 4 per cent yield basis, it is becoming practicable to invest at 5 per cent or more in well-covered preference shares. On the popular and most marketable issues, returns are a good deal less; but, as the following quotations from dealers' lists show, the higher ranges include some good securities. Five per cent yields are available from London Electric Wire 7½ per cent preference at 30s, from Ferranti "sevens" at 28s, and from Reliance-Clifton Cables "fives" at par. Phoenix Telephone & Electric 5½ per cents at 21s 7½d give a little more, while Plessey 4½ per cent second preference at 16s 9d pay 5⅜ per cent. On Wolf Electric Tools 7 per cents and Marryat & Scott 6 per cent redeemable preference the return is about 5·6 per cent. Yields of over 6 per cent are offered on Rothermel 4½ per cents at 14s and Engineering & Lighting 7 per cents at 20s 6d, the latter being ex the 4½ years' dividend arrears just paid off.

Brazilian Notes

From Our Rio Correspondent

AT the instance of the new Governor of Minas Geraes the Cia. de Electricidade do Medio Rio Doce, with a capital of 27 million cruzeiros (£540,000), is being formed to exploit the hydro-electric power of the Fumaça (or Peixe) Cataracts. These are situated on the Tronqueiras River, an affluent of the Middle River Doce, and have a natural fall of 400ft. The State Government will subscribe 50 per cent of the capital and will guarantee a minimum interest of 6 per cent per annum to private investors.

The project, of which particulars are published in the *Diario Oficial*, will be carried out in two stages, in accordance with the local demand for electricity. It provides for three 1,750 kVA turbo-generators (6·9 kV, 60 c/s); a 6·9/33 kV transformer station; and a substation with capacity of 5,250 kVA.

Four-Year Plan

Details of the San Paulo Four-Year Plan have now been announced by the Governor of the State. It involves a total expenditure of £227 million, of which £140 million will be covered by normal revenue, the remainder to be financed by loans. In the public works sector the scheme provides for improvements to State-administered railroads, including extensive electrification; new water and drainage systems in Santos, San Paulo and certain inland towns; completion of the Salto Grande power station, now under construction, and four new power stations at Barra Bonita, Ibitinga, Avanhandava and the north-western part of the State.

In view of recent delays in obtaining sterling exchange, commercial associations and importers have been insistently demanding the introduction of "graphic accounts." Under this system the importer deposits at the Bank of Brazil the currency equivalent at the official rate of the day, and is guaranteed that the same rate will be applied when cover is distributed. A semi-official statement in the Press announces that the Exchange Department of the Bank of Brazil should receive within the next two months £40 million, resulting from the sale of cotton to Great Britain. This additional sterling will enable the Bank of Brazil to attend to all applications for exchange now awaiting consideration, rendering unnecessary the introduction of "graphic accounts."

Recent official announcements by the Minister of Finance, or the Export–Import Department, include the following:—

(1) The temporary suspension of applications to import non-essential products, under the trade agreements with Britain and certain other countries, was intended solely to facilitate distribution among importers of the balance of exchange remaining under the agreements. Once this has been done the Department will resume accepting applications to import less essential products.

(2) Steps are being taken to provide immediate exchange cover for imports to be paid for in any currency; to increase the number of essential articles that may be imported, and to reduce bureaucratic formalities connected with the granting of licences.

(3) Licences will be granted liberally for the importation of raw materials, machinery and equipment, particularly for production goods and new industries. The San Paulo office of the Export–Import Department has been authorized to deal directly with applications to import, thus avoiding heavy delay in referring them to Rio. Other offices will be similarly authorized as soon as possible.

Vacuum Cleaner Jubilee

TO celebrate the 50th anniversary of the world's first vacuum cleaner the British Vacuum Cleaner & Engineering Co., Ltd., has produced a booklet containing a brief history of developments in vacuum cleaning since 1901. Drawings and photographs convey the atmosphere of the earlier days of the century very well. The booklet includes a portrait of Mr. H. Cecil Booth, the inventor of the vacuum cleaner and chairman of the B.V.C. Company.

RECENT INTRODUCTIONS

NOTES ON NEW ELECTRICAL AND ALLIED PRODUCTS

Air-Break Switchgear

A NEW range of medium voltage air-break switchgear introduced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, is designed for service at up to 660 V a.c. and is available in single, double or four-tier form as follows: single-tier for breakers up to 3,000 A, double-tier for breakers up to 800 A or for isolators of all ratings and four-tier for fused switches up to 400 A or for contactors.

The sheet-steel cubicles are compact and of pleasing appearance and at the same time allow easy access to any part of the equipment. They are of standard height and depth with instrument panels of corresponding dimensions so that various units may be assembled to form a complete switchboard to suit individual requirements.

Circuit breakers are of the horizontal draw-out type, with breaking capacities of 15 to 30 MVA at 400 V and are available in three sizes with maximum current ratings of 800 A, 2,000 A and 3,000 A.

Surface Mounting Switch

The flush pattern domestic lighting switch rated at 5 A which embodies a very simple action was first introduced by ROLLS SWITCHES, LTD., Blackfriars Road, London, S.E.1, at the British Industries Fair last year (see *Electrical Review*, 12th May, 1950, page 938). A surface mounting model is now available and because of the very unusual operating mechanism it has a projection of only §in; its diameter is 2¼in.

Below left: **G. P. Dennis cooker control unit with 30 A main switch and 13 A fused flat pin plug and switched socket outlet.** *Right*: **Rolls surface mounting 5 A switch**

Weatherproof plug adaptor by Lewden Metal Products, Ltd.

Weatherproof Plug Adaptor

A two-way weatherproof plug adaptor is available from LEWDEN METAL PRODUCTS, LTD., 5, Argall Avenue, Leytonstone, London, E.10. One B.S. gauge three-pin model and two Walsall gauge three- and four-pin adaptors are available, while 15 A types are in production and will be ready for delivery in the near future.

Robust, all metal, cellulose finished, they are of the screw cap type and include rubber washers at the cable inlet for secure weatherproofing. They are all suitable for attachment to standard watertight switchgear.

Lighting Fittings

Though made of steel the metalwork of a new range of lighting fittings brought out by WILLIAM MCGEOCH & CO., LTD., 46, Coventry Road, Birmingham, 10, is made to present the appearance of a variety of different non-ferrous finishes: brushed copper, centique and satin brass, silver and chromium. Nine different designs of these light pendant bowl fittings are available, each with wall brackets to match.

All the bowls, which are 22in in diameter, are interchangeable and are supplied with or without metallic ring decorations. Fleur-de-lis and spotted designs are among the effective decorative effects employed for the glassware itself. A new range of bulkhead and watertight fittings has also just been brought out by the same manufacturers.

Semi-Rotary Drive Mechanism

The "Rotasol" semi-rotary drive mechanism developed by SALFORD ELECTRICAL INSTRUMENTS, LTD., has a torque inversely proportional to the total length of the rotary stroke. These general-purpose electromagnetic impulse motors have been designed with a 30 deg stroke, but this may be varied to suit individual requirements.

Three models have been developed all of which use the same basic motor. Type 2, Mk 1B drives an assembly of wafer switches and may be impulsed at between 8 and 14 impulses/sec. A ratchet and pawl mechanism in the wafer

assembly transmits power to the rotor shaft and a spring returns the armature when the energizing current is interrupted.

Type 2, Mk 11B is arranged so that the ratchet and pawl mechanism is inoperative, the rotors returning with the armature when the coil is de-energized. Type 2, Mk 111A is similar to Mk 1B but can be "homed" to cancel previous rotor setting.

The drive mechanism for these units can be supplied for a wide range of operating voltages and power outputs. In addition to the positive control of multiple complex circuits, a reserve of mechanical power can be made available for the performance of duties other than switching operations.

Tube Bender's Extended Range

To extend the range of its two-stage tube bending machine, CHAMBERLAIN INDUSTRIES, LTD., Staffa Road, London, E.10, has introduced the "Staffa Senior" former head. This enables steam and gas tubes of all classes with diameters up to 3in to be dealt with.

Emergency Lighting Unit

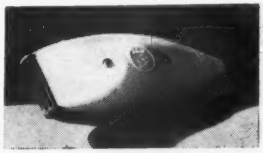
Equipment which automatically provides illumination of premises when normal lighting is interrupted has been introduced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. A spotlight on the unit contains an "Osram" 6 V bulb, which is connected through a relay to an "Exide" battery if the mains supply fails, this battery being kept charged by means of a built-in automatic charger.

G.E.C. emergency lighting unit, incorporating spotlight, battery and automatic charger

Two 5 A sockets on top of the case enable two lamps to be installed remotely if desired, or the lamp on the unit may be used in conjunction with one other in a remote position. The total rating of these lamps may be as much as 60 W. The equipment will operate on 100/120 or 200/250 V, 40 to 100 c/s supplies.

Dry Shaver

The "Kub" dry shaver introduced by CHILTON ELECTRIC PRODUCTS, LTD., Hungerford, Berks, is almost silent in operation and has no rotating parts or bearings needing renewal. No interference is caused with radio or television. The price is 55s (plus P.T. in this country) for the standard model and 66s (plus P.T.) for the dual voltage model (100–120 V or 210–250 V). The transformer adaptor is available for 17s 6d.



The "Kub" dry shaver

Miniature Hearing Aid

The latest hearing aid to be introduced by JOHN BELL & CROYDEN, 117, High Street, Oxford, measures only 42 mm by 65 mm by 19 mm and weighs 3 oz including batteries. It contains two plug-in valves and has an amplification of 45 db at 1,000 c/s. Thus, despite its small size, the instrument is powerful enough to give adequate benefit to almost any average case of hearing deficiency.

Wood Engraver

A wood engraving tool in the form of an electrically heated pencil has been introduced by the ACRU ELECTRIC TOOL MANUFACTURING CO., LTD., 123, Hyde Road, Ardwick, Manchester, 12. Apart from its obvious application it can also be used to emboss almost any material with foils which are available in ten different colours. Embossed writing done in this way is durable and not easily erased. The pencil is rated at 30 W and is available for operation on all normal mains voltages.

Small Cabinet Type Cooker

New features incorporated in the latest version of the model "743A Junior" cooker made by TRICITY COOKERS, LTD., 109, Kingsway, London, W.C.2, are a radiant type grill boiler with "Simmerstat" control and thermostatic control for the oven. The finish is all ivory vitreous enamel as compared with ivory and black on the standard type, and improved door handles are fitted. The price is 18 gns.

NEW BOOKS

The Electricity Statutes, Orders and Regulations. Compiled by Norman Elliott. (Second edition.) Pp. 559 and index. Obtainable from A. L. Burnell, 10, Queen's Gardens, Hove, 3, Sussex. Price 21s.

Since the first edition was published in 1948 a number of orders and regulations have been made under the terms of the 1947 Electricity Act and these are embodied in this new edition. Sections of the 1948 Local Government Act relating to the rating of electricity hereditaments, etc., have been included and other additions are Section 79 of the 1948 Finance Act dealing with income tax and profits tax of Electricity Boards and the 1950 Public Utilities Street Works Act. There is a very adequate index (72 pages).—J.H.C.

Automobile Efficiency: Maintaining Performance with Electrical Test Equipment. By E. T. Lawson Helme, A.M.A.E.T., A.M.I.M.I. Published for *The Motor Trader* by the Trader Publishing Co., Ltd., Dorset House, Stamford Street, London, S.E.1. Price 10s 6d (postage 4d). Pp. 116; figs. 56.

Practical advice is given on modern service station requirements; causes of poor performance; how each component of a vehicle's electrical installation operates and how it may be checked and serviced; how an electrical repair shop may be established, equipped and operated as part of the service; and how a battery-charging department may be set up and operated.

Kempe's Engineers' Year Book. Edited by B. W. Pendred, M.I.Mech.E., M.I.S.I. Pp. 2915; illus. Morgan Bros. (Publishers), Ltd., 28, Essex Street, Strand, London, W.C.2. Price (2 vols.) 65s.

The 56th edition of this veteran desk companion, which deals comprehensively with civil, electrical and mechanical engineering, covers two years, 1950 and 1951. This departure from previous practice is explained partly by delays in printing and binding and partly by the considerable alterations that have been made in its contents, both in their general arrangement and in revision of technical matter in the light of recent developments. Over 50 specialists have contributed to the work. Electrical engineering itself forms the subject of an article of 152 pages by J. M. Burnett, but taken with other articles relating to electrical and allied applications the proportion of the whole work that may be included in this category is nearer one third, apart from scattered references throughout. The hope of the editor that the changes in presentation will be an improvement, it seems to me, has been fulfilled.—C.O.B.

Books Received

Radio Circuits. By W. E. Miller, M.A. (Cantab.), M.Brit.I.R.E. Third edition. Pp. 120; figs. 58; index. Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 5s.

Electric Illumination. By J. O. Kraehenbuel. Second edition. Pp. 446; figs. and index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 64s in U.K.

Radio Installations. By W. E. Pannett. Pp. 454; figs. 244; index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 45s.

Fundamental Principles of Road Passenger Transport Operation. By F. G. Fletcher. Pp. 287. Macdonald & Co. (Publishers), Ltd., 16, Maddox Street, London, W.1. Price 21s.

Wiring Circuits. By E. Molloy. Pp. 216; figs. 277; index. George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2. Price 10s 6d.

Gas Turbine Manual. By R. J. Welsh & G. Waller. Pp. 243; figs. 113; index. Temple Press, Ltd., Bowling Green Lane, London, E.C.1. Price 25s.

Electronic Engineering

IN January last E.M.I. Institutes, Ltd., inaugurated a special four-year course in electronics together with a scholarship scheme providing for considerable financial assistance to selected candidates. The E.M.I. group have an option on the services of beneficiaries under this scheme. In view of the continuing demand for highly trained engineers, E.M.I. Institutes, Ltd., propose to hold similar courses and scholarship schemes annually. The next four-year course is scheduled to start on 27th August, 1951, the commencing date having been advanced to fit in with the normal school leaving period, and applications must be received by E.M.I. Institutes, Ltd., 10, Pembridge Square, London, W.C.2, not later than 6th July.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specifications (2s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1945

16040. British Thomson-Houston Co., Ltd.—Gas turbine power plant. 22nd June, 1945. (656088.)

1946

28222. Colonial Radio Corporation.—Automatic tuning apparatus for receivers of the signal-seeking type. 20th September, 1946. (655872.)

30843. British Thomson-Houston Co., Ltd.—Liquid fuel atomizing systems. 16th October, 1946. (656090.)

1947

160. Western Electric Co., Inc.—Transmission systems for radio waves. 2nd January, 1947. (655936.)

4179. Igranic Electric Co., Ltd., and West, R. A.—Electric motor control systems. 13th February, 1948. (656055.)

9328. General Aniline & Film Corporation.—Compensating circuit for electrical instruments. 8th April, 1947. (656056.)

12576. Philips Lamps, Ltd.—Method of automatic electric arc-welding of work-pieces by means of a plurality of coated welding rods. 9th May, 1947. (655940.)

16203. Standard Telephones & Cables, Ltd.—Electric selecting circuits. 19th June, 1947. (655941.)

19269. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Electric pick-ups for use in instruments for indicating or recording mechanical displacement, velocity or acceleration. 18th July, 1947. (655942.)

22442. Martin, C.—Electro-acoustic devices. 12th August, 1947. (656060.)

27888. Telemecanique Electrique.—Braking system for electric motors. 17th October, 1947. (656062.)

30315. British Thomson-Houston Co., Ltd.—Temperature indicating devices. 14th November, 1947. (655949.)

33637. Clack, G. T.—Arrangements for displaying letters and numerals on a cathode-ray tube. 10th December, 1948. (655975.)

34066. British Thomson-Houston Co., Ltd.—Power-transmission devices. 23rd December, 1947. (655956.)

34073. Claesson, P. H. E., and Grundin, I. W.—Automatic switching arrangement. 23rd December, 1947. (655974.)

34075. Albiswerk Zurich Akt.-Ges.—Radio control system for traffic signals. 23rd December, 1947. (655876.)

1948

5842. British Thomson-Houston Co., Ltd.—High-speed rotors. 26th February, 1948. (655880.)

5962. Director of the Office of Technical Services, Department of Commerce.—Transmission line. 27th February, 1948. (655881.)

6042. Allegheny Ludlum Steel Corporation.—Magnets produced from beryllium alloy steels. 27th February, 1948. (655882.)

6094/5. English Electric Co., Ltd., and Asbury, A.—Control systems for dynamo-electric machines. 28th February, 1949. (655981/2.)

9241. Wogerbauer, A.—Resistance-welded metal building elements comprised of at least one surface sheet and webs, and processes and devices for its manufacture. 1st April, 1948. (655888.)

9640. Abbey, A. (Wave Power Development, Ltd.).—Method and means for harnessing wave power. 6th April, 1948. (655987.)

10923. Staatsbedrijf der Posterijen Telegrafie en Telefonie.—Receiver for signals consisting of variations of resistances or voltages in an electrical circuit. 20th April, 1948. (656063.)

11860. Diamond H Switches, Ltd., and Walton, G. H. F.—Thermostatic control systems for ovens and the like. 15th December, 1948. (655989.)

19213. Radio Corporation of America.—Time division multiplex communication systems. 16th July, 1948. (656023.)

20593. Automatic Electric Laboratories, Inc.—Desk telephone switch. 4th August, 1948. (656025.)

22931. British Thomson-Houston Co., Ltd.—Brush belt removing means for vacuum cleaners. 31st August, 1948. (655959.)

23165. Igranic Electric Co., Ltd.—Driving mechanisms. 2nd September, 1948. (656067.)

24043. Aircraft-Marine Products, Inc.—Electrical connector. 13th September, 1948. (Cognate application 24044. 26th February, 1948.) (656029.)

24406. Pye, Ltd., and Weighton, D.—Television transmitting apparatus. 14th September, 1949. (656069.)

26284. Creed & Co., Ltd., and Salmon, R. D.—Keyboard controlled telegraph apparatus. 8th October, 1948. (656031.)

29303. Foster Transformers & Switchgear, Ltd., and Jennings, R. E.—Electric motor control systems. 8th November, 1949. (655922.)

29443. Egyesult Izzolampa es Villamossagi Reszvenytarsasag.—Coiled-coil electric incandescent lamp. 12th November, 1948. (655923.)

30452. Stanbury, K. S.—Telephone substation apparatus. 23rd November, 1948. (Cognate application 30453, 22nd March, 1948.) (655927.)

31527. Bergstrand, E. O.—Electromagnetic apparatus for measuring distances. 6th December, 1948. (655960.)

31955. Mayo, B. J.—Electrostatic electron lens systems. 25th November, 1949. (655966.)

32086. Simplex Electric Co., Ltd., and Osborn, F. W.—Electric tumbler switches. 8th December, 1949. (655990.)

32349. Bechmann, R.—Piezo-electric crystals. 7th December, 1949. (655994.)

32766. Pye, Ltd., and Lax, L.—Peak-measuring voltmeter. 15th December, 1949. (656002.)

32885. Doane, L. C.—Electrical connector comprising vapour and explosion proof plug-and-socket. 20th December, 1948. (656004.)

33330. Brookhirst Switchgear, Ltd., and Shreeve, A. G.—Control systems and control gear for electric motors. 23rd December, 1949. (656046.)

33689. Elliott Bros. (London), Ltd., and Hawkes, H. D.—Electric measuring instruments. 30th December, 1949. (Addition to 616325.) (656078.)

1949

187. Westinghouse Electric International Co.—Dielectric heating. 4th January, 1949. (656084.)

I.E.E. Western Centre

The annual general meeting of the Western Centre of the Institution of Electrical Engineers will be held on 2nd July at the South Wales Institute of Engineers, Cardiff.

Dual Capacity Goods Lift

For Two-Ton or Five-Ton Loads

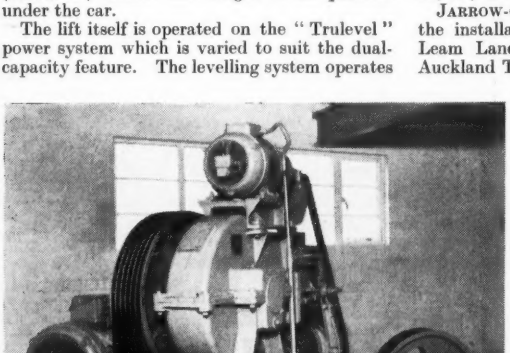
IN many factories it is periodically necessary to move from one floor to another equipment which is considerably heavier than that normally handled. In the past this has presented a problem, as the only lifts designed to take heavy loads were relatively low-speed goods lifts which if installed for general use would slow down the flow of goods.

This difficulty has been solved by the Express Lift Co., Ltd., and in their dual capacity goods lift the attendant can change from low to higher speed in a few minutes without leaving the lift car. The lift is designed to raise loads of 2 tons at 150ft/min or 5 tons at 50ft/min. The counterweight is balanced for the maximum load of 5 tons.

For normal working, i.e., for lifting 2 tons at 150ft/min, a weight of 1·5 tons is carried beneath the car in a specially developed release mechanism. To balance the lift for loads up to 5 tons, this weight is deposited in a cradle at the bottom of the lift pit. To do this the attendant takes the car down to the pit, withdraws a trap in the floor and moves a small lever which operates the release mechanism.

The system is fully electrically interlocked to ensure that the weight carried beneath the car can only be released at the pit bottom ; that the lift cannot start unless the release mechanism is properly reconnected ; and that the lift cannot run at the higher speed (150ft/min) unless the weight is in position under the car.

The lift itself is operated on the "Trulevel" power system which is varied to suit the dual-capacity feature. The levelling system operates with both lifting capacities, the lift stopping from a levelling speed of 12ft/min. Two motors are used, a single-speed squirrel-cage motor and a two-speed pole-changing machine. The single-speed motor is permanently connected to the worm shaft, but the pole-changer is connected to the "Trulevel" clutch. The single-speed motor provides full-speed running for 2 tons at 150ft/min, while the high-speed winding of the pole-changer provides full-speed running for 5 tons at 50ft/min and the low-speed winding provides the levelling speed for both capacities.



Typical heavy-lift machine as used for dual capacity goods lift

Street Lighting Schemes

CHESTER Corporation is applying to the Minister of Transport for consent to carry out various street lighting works including the following:—Frodsham Street, 240 W horizontal fluorescent (£980); Overleigh Road, 500 W tungsten (£985); Foregate Street, 320 W 5ft vertical fluorescent (£1,999); City Road, 180 W 3ft vertical fluorescent (£1,568); Northgate Street, 320 W 5ft vertical fluorescent (£668); and Brook Street, 500 W tungsten lamps (£246).

ALNWICK U.D.C. has applied to the Ministry of Transport for sanction to the following loans in connection with an electric street lighting scheme:—Trunk road, £2,786; classified roads, £3,095; and others, £1,258.

JARROW-ON-TYNE Town Council has approved the installation of 51 street lighting units in Leam Lane between Harbottle Crescent and Auckland Terrace. The cost will be £4,300.

HOUGHTON-LE-SPRING (Durham) U.D.C. is to complete the conversion from gas to electricity of the street lighting system on road A.182 between Grasswell and the Queen's Head Inn, Newbottle.

HEBBURN-ON-TYNE U.D.C. has accepted the estimate of the North Eastern Electricity Board at £1,223 for providing street lighting on the Campbell Park No. 2 housing estate and at £577 for similar work on the Mill Lane estate.

SUNDERLAND Finance Committee has approved an expenditure of £3,573 on installing electric street lighting in Durham Road.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Australia.—SYDNEY.—16th August. County Council. Oil immersed current limiting reactors. (C.R.E. (I.B.) 63936/51. Ten/2612.)*

Beckenham.—6th July. Town Council. Supply of 125 2 kW convector heaters. (See this issue.)

Belgium.—BRUSSELS.—4th July. Belgian State Railways. Electro-mechanical signalling equipment. (C.R.E. (I.B.) 63898/51. Ten/2608.)*

Bingley.—9th July. Urban District Council. Street lighting installation. (See this issue.)

Canada.—TORONTO.—16th July. Transportation Commission. Supervisory control equipment for 23 traction power stations and four subway control zones. (C.R.E. (I.B.) 62089/51. Ten/2596.)*

Cleethorpes.—4th July. Corporation. Electrical installations in 96 dwellings. (See 22nd June issue.)

India.—DELHI.—13th July. Director General (Supplies and Disposals). Transformers. (C.R.E. (I.B.) 63356/51. Ten/2592.)*

Kendal.—10th July. Town Council. Street lighting equipment. (See 22nd June issue.)

Loughborough.—7th July. Corporation. Street lighting equipment. (See this issue.)

Middlesex.—County Council. Contractors wishing to tender for electrical and other installations should apply to the county architect for application forms. (See 22nd June issue.)

New Zealand.—AUCKLAND.—6th August. Auckland Electric Power Board. Submarine e.h.v. cable and accessories. (C.R.E. (I.B.) 63127/51. Ten/2581.)*

DUNEDIN.—15th February, 1952. Pumping plant, including electric motors and equipment for Musselburgh sewage station. (C.R.E. (I.B.) 63426/51. Ten/2605.)*

WELLINGTON.—3rd July. Post and Telegraph Department. Capacitors. (C.R.E. (I.B.) 63427/51. Ten/2591.)*

Newbiggin (Northumberland).—30th July. U.D.C. Supply and erection of 95 standards, electric lamps and auxiliary equipment on classified roads and other streets in the town. Council surveyor.

Preston.—Corporation. Electrical installation at Ribbleton Hall County Primary School. (See 22nd June issue.)

Southend-on-Sea.—Town Council. Hot water space heating and domestic hot water supplies; and electric lighting and power systems. (See 22nd June issue.)

Truro.—City Council. Installation of electricity in the Regent Theatre. (See 22nd June issue.)

Wiltshire.—14th July. County Council. Electrical installation in new secondary modern school, Melksham. (See this issue.)

ORDERS PLACED

Bedford.—Town Council. Accepted. First portion of 7-year street lighting programme (£9,406).—Revo Electric Co.

Bradford.—Corporation. Provision of switchboard and rewiring of sub-circuits at the Windsor Halls (£470).—W. B. Parker (Leeds). Installation of electricity in 24 houses at Faxfleet Street (£377).—Shann & Bell, Ltd.

Education Committee. Installation of electricity at Clayton Infants' School (£2,122).—Southern & Redfern, Ltd.

Brighton.—Education Committee. Electrical work at Technical College.—Hall & Stinson, Ltd. (£158) and W. H. Fellingham & Sons, Ltd. (£257).

Derby.—Corporation. Installation of electricity in 102 houses on the Mackworth estate (£2,850).—H. I. Petts.

Lowestoft.—Corporation Transport Committee. Electrical installation at transport depot building (£592).—Eastern Electricity Board.

Warrington.—Corporation Watch Committee. Electrical wiring in police houses at present under construction (£348).—Charters Electrical Co., Ltd.

Town Hall, Parks & Baths Committee. Rewiring of the electrical installation at the Public Baths (£1,317).—W. E. Kidd (Warrington).

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Basingstoke.—Special school for deaf children; county architect, The Castle, Winchester.

Bedford.—Flats (88), Old Ford End site; borough surveyor.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

Birmingham.—Extensions to Cowley Home for the Blind (£12,000); D. Charles, Ltd., 220, Cooksey Road, Smallheath, Birmingham.

Blackburn.—Nursery schools at St. James Road and Longshaw; borough surveyor.

Boston.—Office block, Willington Road, Kirton; T. J. Barber & Son, 40, Hessle Avenue.
Houses (16), Carlton Road; borough architect.

Brighton.—Technical block and adaptation of Varndean Secondary Boys' School (£17,000); education officer, Marlborough House, Old Steine, Brighton.

Bury.—Dwellings (82), Topping Fold estate; E. S. Smith, town clerk, Town Hall.

Carlisle.—Geriatrics unit at Carlisle General Hospital for Newcastle Hospital Board (£70,000); N. Edgar, divisional architect, 1, Lonsdale Street.

Carmarthen.—Fire station and headquarters, Lime Grove Avenue, for Carmarthenshire C.C.; W. T. Lloyd, architect, County Hall.

Chesterfield.—Houses (100), Newbold estate; borough architect.

Corby.—Infants' school; W. E. Cockerill & Sons, 7, Milton Street, Northampton.

Coventry.—Hostel block at Canley Training College, including 75 study bedrooms, students' accommodation, staff flats, etc.; W. L. Chinn, director of education, The Council House.

Darlington.—Aged persons' hostel at Firth Moor (£31,000); borough architect.

Denton.—Houses (22), Haughton Hall site, for U.D.C.; Martin & Shepley, Ltd., 190, Victoria Street, Hyde.

Durham.—Flats (24), Church Street, for the City Council; H. F. Mole, builder, Chester-le-Street.
Technical colleges at Durham City and Easington; county architect, Court Lane, Durham.

Folkestone.—Houses (40), Biggins Wood; S. A. Rye, Ltd., builders, Shaftesbury Avenue, Cheriton.

Frome.—Houses (37), Nunney Village, for R.D.C.; H. H. Goldsmith, architect, 18, Gay Street, Bath.

Gloucester.—Houses (148), Matson estate; John Laing & Son, Ltd., Bunns Lane, N.W.7.

Golborne.—Houses (32), Newton Road and Maple Avenue, Lowton; U.D.C. surveyor.

Gosport.—Flats (80), Wilmott Lane; town clerk, Town Hall.

Guisborough.—Maternity block at Guisborough Hospital for Newcastle Hospital Board, "Dunira," Osborne Road, Newcastle-on-Tyne.

Halesowen.—Primary school; county architect, 14, Castle Street, Worcester.

Henley-on-Thames.—Flats, Gainsborough Hill site (£40,228); Walden & Son, builders, Empstead, Henley-on-Thames.

Irthlingborough. Houses for U.D.C.: W. Thompson & Sons, Ltd., 38, Finedon Road, Irthlingborough (10 houses), R. C. Tann, Ltd., Finedon Road (12 houses) and R. Marriott, Ltd., Higham Road, Rushden (16 houses).

Kidderminster.—Proposed factory on site in Stourport Road; National Standard Co., Ltd., wire braid manufacturers, Stourport.

Lancashire.—C.P. school, Bowlee (£98,545); county architect, Preston.

Lincoln.—Houses (82), Hartsholme estate; city architect.

Liverpool.—Houses for T.C. at Croxteth (320) and Speke estate (180); Unit Construction Co., Ltd., Bentham Drive, Liverpool.
Flats (78), Smithdown Lane; Peak Construction Co., Ltd., 49, Hamilton Square, Birkenhead.

Macclesfield.—Fire station, Field Bank Road site; county architect, Chester.

Middlesbrough.—Factory for the Guisborough Shirt Co., Ltd.; Matkin and Hawkins, architects, Barclays Bank Chambers, Fawcett Street, Sunderland.

Mold.—Houses (51), Bromley estate; F. C. Roberts, architect to U.D.C., Earl Chambers, Mold.

North Riding.—Infants' schools at Eston and Loftus and county school at Romanby; county architect, County Hall, Northallerton.

Plymouth.—Houses (105), Sussex Terrace, Ford, Beacon Park, Ernesettle and Whitleigh estates; city architect, Seymour Road.

Redhill.—Large extensions to works (£120,000); Monotype Corporation, Honeycrock Lane, Salfords, Redhill.

Sheerness.—Primary school, Rose Street (£66,000); county architect, Maidstone.

Sheffield.—Dwellings for T.C. at Basegreen estate:—H. Dernie & Sons, Ltd., 69, Stovin Road (106 houses and 32 flats); Bailey & Martyn, Ltd., 44, Bank Street (83 houses); C. Redmile & Son, 11, Gleadless Common (54); Seymour Bros., 12, Cawthorne Road (67); Ackroyd and Abbott, 47, Willoughby Street (70); F. Ridal & Sons (Builders), Ltd., 8, Cobden View Road (54); Melling Bros., Ltd., Balfour Road (47); Reeves Charlesworth, Ltd., 27, Wilkinson Street (108); A. G. Redmile, Ltd., 61, Norton Park Road (40); C. L. Marcroft, Ltd., Morstone Crescent, Totley (36); and H. R. Smith (Contractors), Ltd. (24 flats). All of Sheffield.

Smethwick.—Rebuilding offices; William Fox & Sons, Ltd., engineers, Brewery Street.

Southend-on-Sea.—Houses (200); borough surveyor.

Spennymoor.—Additions to Spennymoor Alderman Wraith Secondary School for Durham C.C. (£71,000); T. Manners & Sons, Ltd., builders, Bishop Auckland.

Stafford.—Flats (76) and houses (52), Manor estate; borough engineer.

Walsall.—Factory for Church & Bramhall, Ltd.; W. Kendrick & Sons, Ltd., Tasker Street, Walsall.

West Hartlepool.—Houses (148), Owton Manor; borough architect, Municipal Buildings.

Weymouth.—Houses (40), Chapelhay estate; borough surveyor.

Workington.—Grammar school; J. H. Haughan, 4, Alfred Street North, Carlisle.

CLASSIFIED ADVERTISEMENTS

DVERTISEMENTS are accepted up to **First Post on** onday of the week of issue, and should be addressed Classified Advertisement Department, Dorset House, tamford Street, London, S.E.1.

LASSIFIED advertisements are **PREPAID at 3/- per** ne (approx. 7 words) per insertion. Where the adversement includes a Box Number this counts as two ords and there is an additional charge of 1/-.

DISPLAYED:—42/- per inch, per insertion. Cheques nd Postal Orders should be crossed and made payable ELECTRICAL REVIEW PUBLICATIONS LTD.

SITUATIONS WANTED:—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1, but if not to be delivered to any particular firm or individual they should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Replies in such cases cannot be returned. The name of an advertiser using a Box Number will not be disclosed.

Original testimonials should not be sent with applications for employment

OFFICIAL NOTICES, TENDERS, ETC.

WILTS COUNTY COUNCIL

Education Committee

To Electrical Contractors

THE Education Committee of the Wilts County Council invite tenders for the provision and installation of the electrical system in the New Secondary Modern School, Melksham.

Applications to tender must be accompanied by a deposit of £2 2s. (cheques only, payable to the Wilts County Council) which will be refunded upon receipt of a bona-fide tender or the return of documents.

Applications should be made not later than Thursday, the 28th June, 1951, and specifications, drawings and forms of tender will be forwarded to applicants as soon as possible after this date.

Tenders will be required to be delivered to this office not later than the first post on Saturday, the 14th July, 1951, and no tender will be received except in a plain sealed envelope which must bear the word "Tender" followed by the subject to which it relates, but should not bear any name or mark indicating the sender.

The successful Contractor will be deemed to be a nominated Sub-Contractor as laid down by Clause 21 of the R.I.B.A. Conditions of Contract (specially adapted for the use of Local Authorities).

The Committee do not bind themselves to accept the lowest or any tender.

F. I. BOWDEN, A.R.I.B.A.,
County Architect's Dept., County Architect.
County Hall, Trowbridge.
20th June, 1951. 2387

BINGLEY URBAN DISTRICT COUNCIL

Street Lighting Installation, Cottingley Housing Site

TENDERS are invited for the supply, erection and installation of 28 street lighting columns, lanterns and auxiliary equipment for the above scheme.

Drawings may be seen and specification, bill of quantities and form of tender obtained from J. S. Lattin, M.I.Mun.E., A.M.T.P.I., Engineer and Surveyor, Town Hall, Bingley, upon payment of a deposit of two guineas, which will be returned on receipt of a bona fide tender not subsequently withdrawn. Cheques to be made payable to Bingley Urban District Council.

Tenders in sealed envelopes, endorsed "Street Lighting, Cottingley Housing Site," and not bearing any mark indicating the sender, must be received by the undersigned not later than noon on Monday, 9th July.

The Council do not bind themselves to accept the lowest or any tender.

F. M. DUNWELL,
Town Hall, Clerk of the Council.
Bingley, Yorkshire. 2352

BOROUGH OF BECKENHAM

THE Council invite tenders for the supply (only) of 125 2-kW Convector Heaters. An outlined specification of the Council's requirements can be obtained on application from the Borough Engineer, Town Hall, Beckenham, Kent.

Sealed tenders, in the plain official envelope provided, endorsed "Tender for Convector Heaters" must reach the undersigned not later than 5 p.m. on Friday, 6th July, 1951. Tenders received after the prescribed date and time will not be considered.

The Council does not bind itself to accept the lowest or any tender. C. ERIC STADDON,
Town Hall. Town Clerk.
Beckenham, Kent.
16th June, 1951. 2378

BOROUGH OF LOUGHBOROUGH

Public Lighting

TENDERS are invited for:

(a) The supply and delivery of steel columns.
(b) The supply and delivery of seventy-five lanterns and sixty-seven sets of auxiliary control gear.
(c) The fixing and wiring of the above lanterns and sets of auxiliary control gear.

Specifications and forms of tender for each of the above may be obtained on application to the undersigned on the deposit of one guinea which will be returned on receipt of a bone-fide tender which is not afterwards withdrawn.

Tenders are to be made out on the forms supplied and are to be delivered to A. Usher, Esq., Town Clerk, Southfields, Loughborough, in plain sealed envelope marked "Public Lighting A.6," not later than noon on Saturday, 7th July, 1951.

The Corporation do not bind themselves to accept the lowest or any tender.

W. GRANGER, A.M.Inst.C.E.,
Southfields, Loughborough. Borough Surveyor.
21st June, 1951. 2380

SITUATIONS VACANT

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS are invited for the following appointments at salaries in accordance with the National Joint Board Agreement.

(a) GENERAL ASSISTANT ENGINEER (Metering) in the Technical Department at Divisional Headquarters, Cardiff. Class AX/CX, Grade 8 (£437-£604 per annum).
(b) COMBUSTION AND EFFICIENCY ENGINEER, East Power Station, Newport. Class F, Grade 7 (£625-£643 per annum).
(c) ASSISTANT COMBUSTION ENGINEER, Upper Boat Power Station, Nr. Pontypridd. Class H, Grade 9 (£609-£633 per annum).
(d) STATION SHIFT CONTROL ENGINEER, Tir John Power Station, Swansea. Class G, Grade 10 (£539-£561 per annum).

Applicants for (a) should possess the Higher National Certificate in Electrical Engineering or an equivalent qualification, and have had experience in the maintenance and testing of Polyphase metering equipment. Experience in the Class "A" Polyphase testing station will be considered an advantage.

Salaries in respect of appointments (b) and (c) are provisional and subject to negotiation through the National Joint Board. Applicants for these appointments should preferably have obtained the Higher National Certificate or its equivalent and previous experience in the operation and efficiency control of high pressure steam plant is essential.

Candidates for appointment (d) should preferably have served a regular apprenticeship, obtained the Higher National Certificate and must have had previous experience in the control room of a modern power station.

The appointments are superannuable in accordance with the British Electricity Authority and Area Boards Scheme.

Forms of application may be obtained from the Divisional Secretary at the address below to whom completed forms should be returned not later than 7th July, 1951.

H. V. PUGH,
Cardiff (Pengam Moors) Divisional Controller.
Airport, Cardiff. 2379

NORTH WESTERN ELECTRICITY BOARD

Area Board Headquarters

APPLICATIONS are invited for the following appointments in the Planning and Development Section of the Chief Engineer's Department at Area Board Headquarters, Cheetwood Road, Manchester, 8.

(1) THIRD ASSISTANT ENGINEER. Applicants should have had a sound fundamental training in electrical engineering and general experience in electricity distribution. Preference will be given to applicants possessing a University Degree or Higher National Certificate in Electrical Engineering.

The duties will include the calculation of system fault levels and load flows on complicated networks, and a good knowledge of mathematics is essential.

The salary for the post will be in accordance with the National Joint Board Revised Agreement and will be within the range of Class AX/DX, Grade 5, i.e., £579/£776 per annum, according to qualifications and experience.

(2) JUNIOR ENGINEER. Applicants should have had a sound fundamental training in electrical engineering, and preference will be given to those possessing a University Degree or Higher National Certificate in Electrical Engineering.

The salary for the post will be in accordance with the National Joint Board Revised Agreement and will be within the range of Class AX/DX, Grade 9, i.e., £375/£552 per annum.

Applications stating age, education, training and qualifications, present post and salary, and post for which application is made, should be received by the Establishment Officer, North Western Electricity Board, Cheetwood Road, Manchester, 8, not later than Saturday, 7th July, 1951.

No. 1 Sub-Area

JUNIOR ENGINEERS (Testing Assistants). Applicants should have had experience of testing work associated with meters, instruments or protective equipment, and should be in possession of at least the Ordinary National Certificate and preferably the Higher National Certificate.

Experience in manufacturers' works will be considered an additional recommendation.

The salary will be in accordance with the National Joint Board Revised Schedule, within the range of Class M, Grades 21-17, i.e., £375/£481 per annum.

JUNIOR ENGINEER (Installation Specifications). Applications are invited for the appointment of Junior Engineer (Installation Specifications) in the Sub-Area Consumers' Engineer's Department, No. 1 Sub-Area.

Applicants should preferably have had experience in contracting work, particularly in large commercial premises, and in preparing specifications.

Possession of the National Certificate in Electrical Engineering, whilst not essential, will be considered an advantage.

The salary for the post will be in accordance with the National Joint Board Revised Schedule, Class M, Grade 19/17, i.e., £415/£481 per annum.

Applications for the above posts, stating age, qualifications, present post and salary, should be received by the Sub-Area Secretary, No. 1 Sub-Area, North Western Electricity Board, Town Hall, Manchester, 2, P.O. Box No. 493, not later than Saturday, 7th July, 1951.

No. 3 Sub-Area

DISTRICT ENGINEER. Applications are invited for the appointment of District Engineer in the Rochdale District of the No. 3 (Oldham) Sub-Area.

Applicants should have had a sound training in electrical engineering, together with considerable experience in the operation and maintenance of sub-stations, underground and overhead high and low voltage networks up to and including 33kV, the supervision of constructional work and the keeping of essential mains and sub-station records. The successful applicant will be responsible for the general maintenance of supply in the district.

Preference will be given to applicants who are Corporate Members of the Institute of Electrical Engineers.

The salary will be in accordance with the National Joint Board Revised Agreement, Class F, Grade 2, i.e., £916/£937/£958 per annum. The post is superannuable.

Applications stating age, education, qualifications and experience, present post and salary, should be received by E. Binns, Esq., M.I.Mech.E., A.M.I.E.E., Sub-Area Manager, No. 3 Sub-Area, North Western Electricity Board, Union Street, Oldham, not later than Saturday, 7th July, 1951.

No. 6 (Lakeland) Sub-Area

APPOINTMENT OF DEMONSTRATORS. Applications are invited for the appointment of Demonstrators in the Whitehaven and Penrith Districts of the No. 6 (Lakeland) Sub-Area.

Applicants should be experienced in public demonstrations of electric cookers and other electrical appliances and hold a recognised certificate in Domestic Science.

Should the successful candidates not already hold the E.A.W. Certificate, they will be expected to take suitable courses to obtain the Certificate, and eventually the Diploma.

The salaries for the posts will be in accordance with Grade 1 of the National Joint Council (Administrative and Clerical Grades) for the Electricity Supply Industry Salary Grades, i.e., £310 × £20 — £390 per annum (Progress beyond £350 will be subject to a certificate that the person concerned is capable of undertaking all the duties of the grade).

Applications stating age, education, training, experience, present post and salary, should be received by the Sub-Area Manager, No. 6 (Lakeland) Sub-Area, North Western Electricity Board, Castle Green, Kendal, not later than Saturday, 7th July, 1951. 2383

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointments in the Construction Section of the Transmission Department at Divisional Headquarters:—

(A) THIRD ASSISTANT ENGINEER (Electrical).
(B) THIRD ASSISTANT ENGINEER (Civil and Mechanical).

Salaries in accordance with the National Joint Board Agreement, Schedule C, Grade 5, Class AX/CX (£579-£753 per annum plus London weighting).

Applicants for appointment (A) should have served an apprenticeship and should possess the Higher National Certificate in Electrical or Mechanical Engineering or its equivalent. They should have had experience in the installation of high-voltage switchgear and the erection of transformers and the laying and jointing of cables. Experience in the interpretation of specifications, the scrutiny of drawings, and dealing with correspondence will be an advantage. Corporate Membership or Graduate Membership of the Institution of Electrical Engineers is desirable.

Applicants for appointment (B) should have received theoretical and practical training in Civil and/or Mechanical Engineering, and preferably should have passed either Parts A and B of the examination for Associate Membership of the Institution of Civil Engineers or the Graduate Membership Examination of the Institution of Mechanical Engineers, or hold qualifications exempting therefrom, and should have had experience in the design and setting out of site works, foundations for buildings and heavy plant, and also in the construction of electrical transmission lines erected on lattice steel towers. Experience in the interpretation of specifications, the scrutiny of drawings and in dealing with correspondence is desirable.

The appointments will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Forms of application may be obtained from the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to whom completed forms should be sent to arrive not later than 14th July, 1951. Envelopes should be endorsed with the appointment sought.

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. 2375

BRITISH ELECTRICITY AUTHORITY

London Division

Shift Charge Engineer, Fulham Generating Station

APPLICATIONS are invited from candidates who have had technical education up to Higher National Certificate standard, including thermo-dynamics as a subject, together with a good general education. Considerable experience in the operation of a large modern power station is essential. Character and ability to deal with staff problems is important.

Salary and conditions of service will be in accordance with the N.J.B. Agreement, Class K, Grade 7 = £825 6s. per annum, including London allowance.

The position is superannuable.

Applications, stating age, qualifications and experience, should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, S.W.1, and be received within 14 days of the appearance of this advertisement.

J. N. WAITE,
Divisional Controller. 2363

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

Norfolk Sub-Area

Sub-Area Headquarters, Norwich. 14/51 R

COMMERCIAL ASSISTANT.

Applicants should be of good address and must be fully experienced in the projection of sound films and have the ability to organize and operate a mobile film exhibition unit. Experience in the application and utilisation of electricity to domestic, commercial and industrial purposes and the ability to lecture to schools, trade associations and women's organizations would be an advantage. Ability to drive a car is essential.

The salary for the appointment will be in accordance with Grade 1 (£310 × £20 — £390) of the National Joint Council Salary Agreement dated 23rd March, 1950.

Applications stating age, education, qualifications and experience with details of present appointment and salary should be submitted to the Manager, Norfolk Sub-Area, Eastern Electricity Board, Duke Street, Norwich, within fourteen days of the appearance of this advertisement.

King's Lynn and Western District. 72/51 R

DEMONSTRATOR

Candidates should have had domestic science training, including electrical housecraft, and should preferably hold the E.A.W. certificate. They should be competent to plan and give cookery demonstrations, including lectures and advice to consumers on the utilisation of domestic electrical appliances. Previous experience in an electricity service centre is desirable.

The salary for the appointment will be in accordance with Grade 1 (£310 × £20 — £390) of the National Joint Council Salary Agreement dated 23rd March, 1950.

Applications stating age, education, qualifications and experience, with details of present appointment and salary should be submitted to the Manager, King's Lynn and Western District, Eastern Electricity Board, Gaywood Bridge, Wootton Road, Gaywood, King's Lynn, Norfolk, within fourteen days of the appearance of this advertisement.

Northmet Sub-Area

Hendon District. 73/51 R

DISTRICT MANAGER (Reference No. 296)

Applicants should be fully qualified engineers having sound commercial and engineering experience gained in the management of electricity undertakings with urban and industrial characteristics, and preferably should be Corporate Members of the Institution of Electrical Engineers.

The salary for this appointment will be £1,200 per annum, and the appointment will take effect from the 1st January, 1952. The Board own a house in the Hendon district which will be available for the successful applicant to rent.

Applications stating age, education, qualifications and experience, with details of present appointment and salary should be submitted to the Manager, Northmet Sub-Area, Eastern Electricity Board, Northmet House, Southgate, London, N.14, to arrive not later than Monday, 16th July, 1951.

Future salaries and conditions of service for these appointments will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination. 2428

BRITISH ELECTRICITY AUTHORITY

South East Scotland Division

Operation and Efficiency Engineer

APPLICATIONS are invited for the appointment of an Operation and Efficiency Engineer at Bonnybridge Power Station, Stirlingshire, on Grade 5, Class F, National Joint Board Agreement; salary range £711-£737.

Conditions of service will be in accordance with the National Joint Board Agreement. The appointment is superannuable.

Applicants should have received a sound technical education and should have previous experience in the operation and maintenance of steam electric plant. A knowledge of high tension switchgear is essential.

Applications, stating age and experience, shou'd be submitted to the undersigned by 7th July, 1951.

J. F. FIELD, Divisional Controller.

British Electricity House,
Portobello, Midlothian. 2411

SOUTHERN ELECTRICITY BOARD

APPLICATIONS are invited for the following posts:—

PLANNING ENGINEER
(Amended Notice)

Uxbridge District of No. 1 (Southall) Sub-Area. Salary, N.J.B. E/7/1 (£579 per annum plus London Weighting). N.J.B. Conditions of Service.

Candidates should have had experience in the preparation of proposals and estimates for extension of H.V. and L.V. networks and sub-stations operated at voltages up to and including 11 kV, and the ability to deal with the preparatory work prior to construction. They should have had a good technical training. Corporate Membership of the I.E.E. would be an advantage.

Applications on forms obtainable from the Sub-Area Secretary and returned to him at 2/6 Windmill Lane, Southall, Middlesex, not later than seven days after the appearance of this notice.

AGRICULTURAL REPRESENTATIVE

Chichester/Portsmouth District of No. 3 (Portsmouth) Sub-Area. Salary, N.J.C. Grade 3 (£450 per annum). N.J.C. Conditions of Service.

Candidates should have a sound knowledge of the applications of electricity in agriculture and horticulture, be capable of preparing estimates for small wiring installations and equipment; conducting negotiations and obtaining new business. Ability to give talks to agricultural organisations will be an advantage.

Applications on forms obtainable from the Sub-Area Secretary and returned to him at Lower Drayton Lane, Cosham, Portsmouth, not later than ten days after the appearance of this notice.

The successful candidates for the above appointments will be required to contribute to the B.E.A. and Area Boards Superannuation Scheme, if eligible.

F. W. KEMPTON, Secretary.
2429

BRITISH ELECTRICITY AUTHORITY

London Division

REQUIRE:—

(a) SENIOR ELECTRICAL DIAGRAM DRAUGHTSMAN.
(b) SENIOR MECHANICAL DRAUGHTSMAN.
(c) SENIOR CIVIL ENGINEERING AND BUILDING DRAUGHTSMAN.

Applicants for (a) should be experienced in originating and checking the associated diagrams and protective systems for main generating plant in power stations and sub-stations.

The duties of (b) consist of layout and general design of generating stations, coal-handling plants, ash and dust handling systems and all pipework required for complete installations, and applicants should be familiar with one or more of these.

Applicants for (c) should have wide experience in the preparation of working drawings for: (1) reinforced concrete; (2) heavy structural steelwork and/or (3) building works in connection with generating stations.

Candidates for all these posts should either be obtaining or in possession of a Higher National Certificate, or equivalent, and practical training will be an added advantage.

The salaries will be in accordance with N.J.B. Schedule D, Class 4/5, i.e., £525 p.a. to £735 p.a., inclusive of London Allowance. The commencing salary will be according to the candidate's age, experience and qualifications. The posts are superannuable.

Applications stating age, qualifications and experience should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, so as to be received within 14 days of the publication of this advertisement.

J. N. WAITE,
Divisional Controller.
2422

UNIVERSITY OF MANCHESTER

APPLICATIONS are invited for ASSISTANT LECTURESHIPS IN ELECTRICAL ENGINEERING. Salary scale £450 to £500 per annum, with membership of the F.S.S.U. and Children's Allowance Scheme.

Applications should be sent not later than 28th July, 1951, to the Registrars, the University, Manchester, 13, from whom further particulars and forms of application may be obtained. 2334

EASTERN ELECTRICITY BOARD

Northmet Sub-Area: Draughtsmen

APPLICATIONS are invited to fill several vacancies upon the staff of the Sub-Area Engineer from candidates having the requisite training and experience for one of the following branches:—

(a) SUB-STATIONS. Layout of switchgear, transformers and associated equipment for outdoor and indoor type sub-stations up to 33 kV.

(b) MAINS. Overhead line design and layout of associated equipment, underground cable trench sections, survey and route plans, and general mains recording maps and plans.

(c) ARCHITECTURAL. Plans and detailed drawings of building and civil engineering works, including reinforced concrete construction, for sub-stations, service centres, workshops and offices.

The salaries offered and conditions of service are subject to negotiation by the appropriate negotiating bodies, but the salaries will not be less than those shown below:—

(i) Senior Draughtsmen, £525-£630 per annum.

(ii) Engineering Draughtsmen (or equivalent in Building), £420-£525 per annum.

(iii) Drawing Office Assistants (or Draughtsmen in training), £258-£415 per annum.

These salaries include an allowance for London weighting.

Successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications, stating age, education, technical qualifications and experience, with details of present appointment and salary, should be submitted to the Manager, Northmet Sub-Area, Eastern Electricity Board, Northmet House, Southgate, London, N.14. 2193

AIR MINISTRY

AIR MINISTRY invite applications for non-pensionable appointments as STATION ENGINEERS in the Directorate General of Works at R.A.F. Stations.

The salary rises to a maximum of £560 per annum, and starting pay depends upon age, experience and qualifications. Annual increases will be granted for satisfactory service where salary is below maximum.

Candidates, who should be natural born British subjects, should have suitable practical experience and possess the following qualifications:—

(a) Ordinary National Certificate in Electrical Engineering or show that they have reached an equivalent standard of technical education.

(b) Have served a recognised apprenticeship in electrical engineering with a firm or establishment of good repute.

(c) Have had three years' employment in electrical engineering, preferably on the operation and maintenance of mine, factory or workshop plant and services.

Preference will be given to applicants who, subsequent to (b) and (c), have had experience of supervising staff.

The work consists of the installation, operation and maintenance of high or medium voltage distribution systems, electrical installations, steam and hot water heating systems and miscellaneous works plant, tools and equipment.

Applicants should state if in addition to experience on above work, they have had responsibility for the maintenance and operation of diesel engined generating plant.

Appointments to locations at or nearest to those specified in applications will be arranged as far as possible.

Applications stating age, qualifications and all previous appointments (with dates), to be addressed to the Air Ministry, Directorate General of Works (W.9), Bush House (S.E. Wing), Strand, W.C.2. 2406

YORKSHIRE ELECTRICITY BOARD

No. 5 (Wakefield) Sub-Area

APPLICATIONS are invited for the following appointment:—

DRAUGHTSMAN (Vacancy No. 79/51).

Applicants should have a knowledge of the theory and principles applicable to the design, layout and construction of civil, mechanical and electrical plant and equipment, site surveys, etc., and be able to work to instructions on general work of this nature and in the building up of modifications using existing designs. Salary £375/£500 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a, Denby Dale Road, Wakefield, within fourteen days of the appearance of this advertisement. 2398

JOHNSON & PHILLIPS LIMITED

have Vacancies for Draughtsmen as under

SWITCHGEAR DEPARTMENT.

TWO SENIOR DRAUGHTSMEN suitably qualified and competent to handle switchgear for indoor and outdoor main stations and sub-stations up to 33,000 volts or to design switchgear apparatus embracing air break and oil break circuit breakers.

Both positions offer good scope to the right men, with prospects of early promotion.

DRAUGHTSMEN FOR SOUTH AFRICA.

Applicants must have good practical and technical experience, particularly in diagram and schematic work. Single men preferred, age range 22 to 25. Good opening for men of the right calibre.

TRANSFORMER DEPARTMENT.

DRAUGHTSMEN capable of handling all medium-size transformers up to 2,000 kVA.

DRAUGHTSMEN capable of handling sizes up to 5,000 kVA.

DRAUGHTSMEN having experience of larger transformers, 30 to 45 MVA.

These openings offer good prospects. Five-day week. Staff pension and bonus schemes. Welfare facilities include: A well-organised athletic club with private sports ground catering for cricket, football, tennis, etc. Works canteen equipped for billiards, table tennis, amateur dramatics, licensed bar.

Applications, giving full particulars of age, training, experience and salary required, to Employment and Welfare Manager, Johnson & Phillips Ltd., Charlton, London, S.E.7. 2129

PROFESSIONAL MECHANICAL AND ELECTRICAL ENGINEERS

APPLICATIONS are invited for appointments to the Assistant Engineer grade in the Engineering Department in the Office of the Receiver for the Metropolitan Police District.

Minimum Qualifications: Candidates must be Corporate Members of the Institution of Mechanical or Electrical Engineers, and must have served an engineering apprenticeship and have had at least three years' professional experience on the appropriate engineering work.

Posts available:—

ONE MECHANICAL ENGINEER to undertake heating, ventilating, steam and auxiliary mechanical plant as applied to modern buildings. Knowledge of electrical work an advantage.

ONE MECHANICAL ENGINEER to undertake automobile engineering, repair workshops, fleet operation and maintenance.

ONE ELECTRICAL ENGINEER to undertake lighting, power, lifts, communications as applied to modern buildings. Knowledge of heating work an advantage.

Salary Scale: £475 × £25 — £750 per annum. Minimum linked to age 25 with weighting of entry salary according to age up to £600 per annum at age 30.

Appointments will be temporary, but there may be prospects of permanent pensionable posts. Hours, leave, sick leave and extra duty allowance similar to those in the Civil Service Engineering grade.

Applications, stating age, experience and qualifications, should be addressed to the Chief Clerk, Engineering Department, New Scotland Yard, London, S.W.1. No testimonials to be sent. 2319

NEW SCOTLAND YARD

ENGINEERING DRAUGHTSMEN required at NEW SCOTLAND YARD, experienced in one of the following:—

(a) ELECTRICAL complete installations, including lifts and fluorescent lighting, for various classes of buildings.

(b) HEATING AND VENTILATING installations, domestic hot water systems and general engineering for various classes of buildings.

Technical education to National Certificate standard required, with apprenticeship and drawing office experience.

Salary scale £300 at age 21 by annual increments to £525. (Under revision and will be increased to £340 to £575, depending upon age.)

44-hour week, with overtime for additional hours, 24 days' annual leave, paid sick leave.

Send full particulars of training and experience to Chief Clerk, Engineering Department, Receiver's Office, New Scotland Yard, London, S.W.1. 2141

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointments in the Transmission Department at Divisional Headquarters:—

THIRD ASSISTANT ENGINEERS (Maintenance Section).

Salary in accordance with the National Joint Board Agreement, Schedule C, Grade 5, Class AX/CX (£579-£753 per annum, plus London Weighting). The commencing salary will depend upon qualifications and experience.

Applicants should have served an apprenticeship and should possess the Higher National Certificate in Electrical Engineering or its equivalent. They should have had considerable experience in the maintenance and operation of high voltage switchgear, transformers, cables and overhead lines up to 132 kV.

Corporate Membership or Graduate Membership of the Institution of Electrical Engineers is desirable.

The appointments will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Forms of application may be obtained from the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to whom completed forms should be sent to arrive not later than 14th July, 1951. Envelopes should be endorsed "Third Assistant Engineers (Maintenance Section)".

W. N. C. CLINCH.
Controller.

Northmet House,
Southgate, N.14. 2412

BORD NA MONA

A VACANCY exists for an ELECTRICAL ENGINEERING ASSISTANT with some experience in industrial electrical installations.

Candidates must possess technical qualifications up to University or A.M.I.E.E. standard, and salary scale will be £400/£25/£800 per annum.

Applications stating age, qualifications and experience should reach the Secretary, Bord na Mona, 28/30, Upper Pembroke Street, Dublin, not later than 7th July, 1951.

2404

BRITISH ELECTRICITY AUTHORITY

Merseyside and North Wales Division

APPLICATIONS are invited for the under-mentioned appointments at Divisional Headquarters, Woolton, Liverpool.

(a) JUNIOR ENGINEERS. Salary, Class AX, Grade 9, £375/£505 per annum.

(b) GENERAL ASSISTANT ENGINEERS. Salary, Class AX, Grade 8, £437/£569 per annum.

Applicants for (a) should have a good general and technical education and possess the Higher National Certificate in engineering or equivalent qualifications.

Applicants for (b) should have a good general and technical education and possess a degree in engineering or equivalent qualifications.

Practical experience in the construction or operation of a modern Power Station or Substation, and experience in a manufacturer's works will be an advantage.

All appointments will be superannuable under the terms and conditions of the British Electricity Authority and Area Boards 'Superannuation Scheme.

Forms of application may be obtained from the Divisional Secretary, Clarke Gardens, Woolton, Liverpool, and should be returned not later than Friday, 20th July, 1951. 2420

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointments in the Transmission Department at Divisional Headquarters:—

GENERAL ASSISTANT ENGINEERS
(Construction and Maintenance Sections).

Salary in accordance with the National Joint Board Agreement, Schedule C, Grade 8, Class AX/CX (£437-£604 per annum plus London weighting).

The commencing salary will depend upon qualifications and experience.

Applicants should possess a Higher National Certificate in Electrical Engineering, and preference will be given to those who have had experience in the manufacture and construction or operation and maintenance of high-voltage equipment.

The appointments will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Forms of application may be obtained from the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to whom completed forms should be sent to arrive not later than 14th July, 1951. Envelopes should be endorsed "General Assistant Engineers (Construction and Maintenance Section), Transmission."

W. N. C. CLINCH.
Controller.

Northmet House,
Southgate, N.14. 2373

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment in the Transmission Department at Divisional Headquarters:—

ASSISTANT SECTION ENGINEER.

Salary in accordance with the National Joint Board Agreement, Schedule C, Grade 6, Class AX/CX (£516-£686 per annum plus London weighting).

The commencing salary will depend upon qualifications and experience.

Applicants should preferably hold Corporate or Graduate Membership of the I.E.E. or equivalent qualifications, and should have had experience in the construction or operation and maintenance of high-voltage overhead lines, cables and sub-station equipment up to 132 kV.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Forms of application may be obtained from the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to whom completed forms should be sent to arrive not later than 14th July, 1951. Envelopes should be endorsed "Assistant Section Engineer, Transmission."

W. N. C. CLINCH.
Controller.

Northmet House,
Southgate, N.14. 2374

BRITISH ELECTRICITY AUTHORITY

South Western Division

Station Shift Control Engineer, Newton Abbot Generating Station

APPLICATIONS are invited for the position of STATION SHIFT CONTROL ENGINEER at Newton Abbot Generating Station.

Applicants should possess good technical qualifications and have had sound technical training and practical experience in the control and operation of steam generating plant and main switchgear.

Salary and conditions of service will be in accordance with the National Joint Board Agreement, Class F, Grade 10, £510-£530 per annum.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Applications, stating age, qualifications, experience, present appointment and salary, should be addressed to the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26, Oakfield Road, Bristol, 8, so as to be received not later than 7th July, 1951.

R. C. BARRETT,
Divisional Secretary. 2372

CITY OF COVENTRY

APPLICATIONS are invited for the following appointments in the Lighting Section of the City Engineer's Department:—

(1) SENIOR ASSISTANT LIGHTING ENGINEER, Grade IV, £530/£575.

(2) JUNIOR TRAINEE (General Division), salary rising to maximum of £425 at age 30.

Applicants for (1) must be capable draughtsmen with experience in the preparation of schemes, specifications and estimates for all classes of public lighting, and have had at least 2 years' experience of general routine practice and maintenance by direct labour.

Preference will be given to persons who have some knowledge of electrical installation work and hold the Higher National Certificate in Electrical Engineering.

For (2) preference will be given to persons already employed in the electrical industry who are studying for an engineering course as approved by the Institution of Electrical Engineers.

All applicants are expected to become members of an appropriate organisation as referred to in paragraph 44 of the Charter.

Forms of application and conditions of appointment may be obtained from the undersigned and must be returned not later than Tuesday, 10th July, 1951.

GRANVILLE BERRY,
M.Inst.C.E., M.Inst.Mun.E.,
City Engineer and Surveyor.

Council House,
Coventry.

2439

SOUTH WEST SCOTLAND ELECTRICITY BOARD

Clyde Sub-Area

Appointment of 2nd Assistant Engineer, Planning and Development

APPLICATIONS are invited for the position of SECOND ASSISTANT ENGINEER in the Planning and Development Section of the above Sub-Area.

Applicants should possess a Degree in Electrical Engineering or have equivalent qualifications and have a wide experience in the design and layout of large underground and overhead distribution systems at pressures up to and including 33 kV in industrial and residential areas. A knowledge and application of modern protection equipment, the calculation of fault levels and the preparation of load flow diagrams is essential.

The salary for the post will be in accordance with the National Joint Board Agreement, Class J, Grade 7, i.e., £736/£770 per annum.

The successful applicant will require to satisfy the Board's medical adviser and contribute to a Superannuation Scheme.

Applications, stating age, education, qualifications, experience, present position and salary, should be received by the Manager, South West Scotland Electricity Board, Clyde Sub-Area, 206, St. Vincent Street, Glasgow, C.2, not later than 14 days after the appearance of this notice.

2354

BRITISH ELECTRICITY AUTHORITY

Senior Draughtsmen, Draughtsmen and Tracers

Chief Engineer's Department

APPLICATIONS are invited for the following appointments in the Drawing Office at Headquarters in London:—

SENIOR DRAUGHTSMEN and DRAUGHTSMEN with experience in (a) power station layout and plant in connection therewith, or (b) civil engineering or building details.

TRACERS with experience in the above or general engineering work.

Salaries will be in accordance with age and experience within the following ranges, which include London allowance: Senior Draughtsmen, Grade 4, £630-£735 p.a.; Grade 5, £525-£630 p.a.; Draughtsmen, Grade 6, £400-£525 p.a.; Tracers, £123 p.a. at 16, rising to a maximum of £338 p.a.

The appointments are superannuable.

Application forms may be obtained from the Secretary's Office (Establishments), Applications Section, British Electricity Authority, British Electricity House, Great Portland Street, London, W.1, and should be completed and returned to D. Moffat, Director of Establishments, at the above address, not later than 13th July, 1951. Please quote reference AE/182.

2359

CROWN AGENTS FOR THE COLONIES

ELECTRICAL ENGINEER (Mechanical) required by the Central Electricity Board, Federation of Malaya, for 3 years, with prospect of permanency. Salary (including expatriation pay) payable in local currency, equivalent at the present Government rate of exchange to £742 a year, rising to £1,652 a year. Commencing salary according to age and experience. Cost-of-living allowance equivalent to between £336 and £707 a year according to salary and dependants. Free passages. Liberal leave on full salary.

Candidates, between 24 and 35 years of age, must have had a good general education and be Corporate Members or Graduates of the Institutions of Electrical or Mechanical Engineers, or possess equivalent qualifications, and have had sound training in both electrical and mechanical engineering, with experience in the operation and maintenance of diesel-alternator generating plant of up to 1,000 kW units. Experience in an electricity supply undertaking would be a distinct advantage.

Apply at once by letter, stating age, full names in block letters and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M.28370B on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration.

2361

COMMONWEALTH TECHNICAL CO-OPERATION SCHEME

APPLICATIONS are invited by the Commonwealth Relations Office for the post of EXPERT DESIGNING ENGINEER under the Government of India, in India, at a salary of £3,000 to £3,500 per annum plus subsistence allowance, travelling facilities and free medical attention. Other facilities, including those for families, to be discussed.

Applicants, preferably between the ages of 45 and 50, should be corporate members of the Institution of Civil, Mechanical or Electrical Engineers and must have considerable experience in the design of extra high tension transmission lines, including tower structures.

The selected applicant will be responsible to the Chairman, Central Waterpower, Irrigation and Navigation Commission, for the mechanical and electrical design of such transmission systems as will be required for grid supply connecting super-hydro power stations and long distance power transmission projects. He will be expected to guide and train the Indian Engineers under his control. The contract is for two years in the first instance.

Forms of application may be obtained from the Ministry of Labour and National Service, Technical and Scientific Register (K), York House, Kingsway, W.C.2, quoting D. 280/51/A.O. Closing date, 28th July, 1951.

2407

SOUTHERN RHODESIA GOVERNMENT

Vacancies: Telephone Technicians

APPLICATIONS are invited from fully qualified TELEPHONE TECHNICIANS, aged 21 to 40, with at least 8 years' practical experience in telecommunications industry or similar service. Appointments on 3-year contract with possibility of renewal for further period. Rate of pay: £55 per mensem plus C.O.L. allowance at present £19 13s. 4d. per mensem. Children's allowances also payable.

Travelling fare will be provided from U.K. to Southern Rhodesia for successful applicants.

Forms and further information from Secretary to the High Commissioner for Southern Rhodesia, 429, Strand, London, W.C.2, to whom completed forms should be returned not later than the 28th July, 1951. Canvassing will disqualify applicants.

2330

DRAUGHTSMEN WANTED

ILFORD Limited Engineering Research and Development Department have vacancies for DRAUGHTSMEN in the following categories:—

(1) ELECTRICAL. Drawing office and workshop experience of power and lighting layouts is essential.

(2) SERVICES. Experience in practical schemes for boiler plant, refrigeration and air conditioning is necessary.

(3) MECHANICAL DESIGN. A wide experience with mechanisms of all types is required.

Permanent and well-paid positions in good working conditions will be offered to competent men. Write fully to—Ilford Limited, P.O. Box No. 10, Romford, Essex.

2248

OLDHAM EDUCATION COMMITTEE

Municipal Technical College

Principal: E. M. Stoddart, B.Sc., Ph.D.(London), Ph.D.(Dunelm), F.R.I.C.

APPLICATIONS are invited for the appointment of a full-time LECTURER in the DEPARTMENT OF ELECTRICAL ENGINEERING. Candidates should possess graduate qualifications and should have had experience both in industry and in the teaching of electrical engineering subjects, including electronics and advanced mathematics.

The salary will be in accordance with the Burnham (Further Education) Report, 1951, for Lecturers, namely £900 × £25 to a maximum of £1,000 per annum.

Forms of application and further particulars may be obtained from the undersigned, to whom they should be returned not later than 14 days after the appearance of this advertisement.

MAURICE HARRISON,
Director of Education.

Education Offices,
Union Street West, Oldham. 2344

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the position of BOILER-HOUSE SHIFT CHARGE ENGINEER at Earley Generating Station.

Applicants must have had a sound technical training and be experienced in all branches of engineering associated with the operation of pulverised fuel fired H.P. boiler plant, and have considerable knowledge of combustion and boiler chemistry. Graduate Membership of the Institution of Mechanical or Electrical Engineers will be a strong recommendation.

The salary will be in accordance with Grade 9, Class G, of the National Joint Board Schedule, at present £571-£597 per annum.

Application forms may be obtained from the undersigned and should be returned not later than 13th July, 1951.

P. D. A. OLIVER,
Divisional Secretary.

British Electricity House,
High Street,
Portsmouth. 2438

BRITISH ELECTRICITY AUTHORITY

(a) JUNIOR ENGINEER (Control), Littlebrook Power Station. Applicants should have had suitable training and experience in the operation of E.H.T. switchgear and parallel running of alternators.

(b) ASSISTANT ENGINEER (Mechanical), Croydon "B" Power Station. Responsible for the planning of mechanical plant maintenance and associated labour. Practical experience of power station layout, operation and maintenance essential.

(c) GENERAL ASSISTANT ENGINEER (Transmission). To take charge of gang of fitters engaged on major overhauls in 132-kV substations. Applicants should have had the training and experience to enable them to organize and supervise this type of work. N.J.B. Conditions of Service and salary for all positions (a) Class J, between Grades 18 and 14, commencing at £400 per annum. (b) Class J, Grade 11, £597 9s. per annum. (c) Class AX, Grade 8, £462 per annum. Salaries quoted include London Allowance. Applications on forms obtainable from Divisional Secretary, B.E.A., S.E. Division, Lower Ham Road, Kingston-on-Thames, to be received by 7th July, 1951. 2377

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the appointment of FIRST ASSISTANT ENGINEER (Senior Section Engineer) in the Northwich District of the Board's No. 2 Sub-Area at a salary in accordance with N.J.B. Grade 4, Class E, £722-£752 per annum.

Applicants should have the technical qualifications necessary to enable them to become Chartered Electrical Engineers and must have had considerable experience in H.T. and L.T. Overhead and Underground Distribution Work.

The appointment will be superannuable and subject to medical examination.

Applications on forms obtainable from The Manager, No. 2 Sub-Area of the Board, Sandiway House, Near Northwich, Cheshire, should be completed and returned so as to be received not later than 12th July, 1951.

JAMES RANKIN, Secretary.
2414

OLDHAM EDUCATION COMMITTEE

Municipal Technical College

Principal: E. M. Stoddart, B.Sc., Ph.D.(London), Ph.D.(Dunelm), F.R.I.C.

APPLICATIONS are invited for the appointment of a full-time ASSISTANT GRADE B in the DEPARTMENT OF ELECTRICAL ENGINEERING. Candidates should possess graduate qualifications and should have had experience both in industry and in the teaching of electrical engineering subjects. The ability to teach mathematics to electrical engineering students would also be expected.

The salary will be in accordance with the Burnham (Further Education) Report, 1951, for Grade B Assistants, namely £450 × £25 to a maximum of £725 per annum, with approved additions for degree and training.

Forms of application and further particulars may be obtained from the undersigned, to whom they should be returned not later than 14 days after the appearance of this advertisement.

MAURICE HARRISON,
Director of Education.

Education Offices,
Union Street West, Oldham. 2345

BRITISH ELECTRICITY AUTHORITY

North Western Division

APPLICATIONS are invited for the following positions:—

No. 485. ASSISTANT SHIFT CHARGE ENGINEER at the Stuart Street Generating Station, Bradford, Manchester, 11.

The salary for this position, which is superannuable, will be £609/£633 in accordance with Grade 9, Class H, of the National Joint Board Agreement.

No. 488. STATION SHIFT CONTROL ENGINEER at the Westwood Generating Station, Wigan.

The salary for this position, which is superannuable, will be £539/£561 in accordance with Grade 10, Class G of the National Joint Board Agreement.

Candidates should preferably possess technical qualifications and previous experience in a generating station is essential.

Applications quoting vacancy number, stating age, qualifications, experience and present position, should be received by the Establishment Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester, 20, not later than 7th July, 1951. 2394

A chief engineer, electronics, from £1,000; glassblower, top rates; assistant foreman, radio components; chargehand, radio; student for assistant physics laboratory; P.A. service engineers, inside and outside, also testers, inspectors, etc.; development engineer, magnetic amplifiers; lab. assistant, relays and thermostats; development engineer, electronic test apparatus; chargehands, coil winding; draughtsmen and tracers.—Technical Employment Agency, 179, Clapham Road, S.W.9 (Brixton 3487). 2396

A FIRM of mechanical and electrical engineers specialising in the production of portable electric lamps and low-voltage electric bulbs requires a young electrical engineer of Higher National standard to take charge of the testing department and the design of electrical equipment. Excellent prospects for an adaptable man with ideas. Applications, stating age, experience and salary required, to—Box 2348.

A WELL-known company requires junior engineers for their steam turbine division in the Midlands. Applicants should have good drawing office experience and a background of practical engineering, preferably directly connected with steam turbines. Please write stating age, experience and qualifications, quoting ref. HJD(1), to—Box 2435.

A WELL-known manufacturer has a vacancy for an experienced contracts engineer to cover comprehensive tenders dealing with heavy mechanical and electrical plant. This is a permanent appointment offering very good prospects. Salary up to £750 per annum according to qualifications and experience. Write, giving full details of age, education and previous experience, mentioning ref. IJH, to—Box 2366.

AMBITIOUS men with suitable experience are invited to apply for posts as senior design engineers with the steam turbine division of a well-known company in the Midlands. Excellent salary and prospects of promotion are offered in a department which is expanding and working on advanced design and development in this field. Please write, in confidence, giving full details of experience and qualifications, quoting ref. HJD, to—Box 2397.

A.C. and D.C. house service meter tester and repairer, London, S.W.—Box 137.

APPLICATIONS are invited for a responsible salaried position as sales representative to handle Association lamps, cables and lighting equipment and Young car batteries, attached to Hull branch. Similar experience, residence on territory and car ownership is desirable. Apply Crompton Parkinson, Ltd., 4/6 New York Road, Leeds, 2. 2381

APPLICATIONS are invited for the position of chief inspector by a large electrical engineering manufacturer in the North-West of England engaged on switchgear, transformer, domestic appliance, etc., production. Senior position, involving control of a large inspection force. Permanent and pensionable. Applicants should have previous inspection experience. Please write, giving details of apprenticeship, technical qualifications and experience, to—Box 2325.

APPLICATIONS invited from qualified electrical engineers for estimating and contract work for industrial switchgear, switchboards and rectifier equipment by leading British manufacturers in a modern factory in the West Country. Good salary with annual bonus and excellent opportunities for advancement. Write, giving full details of education, technical training and practical experience, to—Box 2257.

ARMATURE winder urgently required for Bombay. Small English-owned electrical firm. £56 per month, plus bonus on output. Fares paid. Director now in England would accompany at start. Must be fully rated skilled man, unmarried. Photos of jobs wound useful.—Caulfield-Holland, West Road, Portslade, Sussex. 9893

ARMATURE winders required for D.C. and A.C. work, London district; 5-day week. Applicants should give full details of experience.—Box 2357.

ASSISTANT electrical engineer, 25-40, for superintendence of operation and maintenance work with public utility Nigerian Plateau. Three years' engagement in two 18-month tours. Generous allowances, ample leave on full pay, free quarters. Superannuation fund maturing age 55. Salary £60 per month or according experience. Applications—Box 2258.

ASSISTANT required for process superintendent in large factory in north-west for the manufacture of paper-insulated cables. Previous experience in cable works preferable but not essential. Write, sending particulars of age, technical education, experience and salary required. —Box 2358.

BRITISH ENGINE BOILER & ELECTRICAL INSURANCE Co. Ltd., 24, Fennel St., Manchester, 4. The company has vacancies for electrical plant inspectors in several districts, including The Potteries, Manchester, Sunderland, Watford, Lincoln, Exeter and Scotland. Permanent positions carrying progressive salary scale £520 to £750 and non-contributory pension. Candidates, age 26 to 30 years, with apprenticeship in the manufacture of electrical machinery and preferably with subsequent experience of repairs and industrial use of electrical machinery, and who have gained the Higher National Certificate in Electrical Engineering or are Grad. I.E.E., are invited to apply in own handwriting, stating age, whether married or single, qualifications and experience. 2349

BRITISH ENGINE BOILER & ELECTRICAL INSURANCE Co. Ltd., 24, Fennel St., Manchester, 4. Applications are invited for the permanent appointment of assistant electrical engineer at this office. Commencing salary from £450 according to qualifications; progressive increases. Non-contributory pension. Candidates should be aged 22-24 and have served an apprenticeship with a leading manufacturer of electrical machinery, transformers and switchgear. Practical experience of the industrial application of electrical equipment an advantage. Graduate membership of the Institution of Electrical Engineers is essential. Applications should state age, whether married or single, and give full particulars of training and experience. 2350

CEYLON. Applications are invited by long-established firm of engineering contractors having vacancies for: (1) Mechanical engineer, (2) Electrical/mechanical engineer. These are permanent appointments with good prospects. Commencing salary approximately £1,000 per annum (rupee equivalent). Terms of service include first class passage to Ceylon and periodic furlough, also provident fund benefits. Applicants must have good general education and have served approved full-time apprenticeships in appropriate trades. Age 24 to 28 years, unmarried. Applications in writing, stating date of birth and full details of qualifications and experience, to—Box "ju 66," c/o 95, Bishopsgate, London, E.C.2. 2204

DESIGNER wanted for low tension A.C. and D.C. control gear. State qualifications, age, experience and salary required.—Box No. 2423, Howats Advertising, 111, Union St., Glasgow, C.1. 2423

COMMERCIAL technical estimator required with knowledge of motor control gear and its application to H.N.C. standard. Age limit 40. Pension scheme. Canteen facilities. Write, giving details of age and experience, to —Personnel Officer, Dewhurst & Partner Ltd., Invernia Works, Hounslow, Middlesex. 23[illegible]

DEPUTY resident engineer required for a large engineering project in Arabia. Applicants must have had good civil engineering training and be familiar with the handling of large contracts. Preference will be given to engineers who also have mechanical engineering experience and hold a professional qualification. Salary in accordance with experience, plus overseas allowance and married accommodation. Applications in writing, giving details of age and experience, should be addressed to—The Secretary, Ewbank & Partners Ltd., Engineering Consultants, 13, Grosvenor Place, London, S.W.1. 23[illegible]

DESIGN engineer required by successful old-established company in the North of England engaged particularly in the manufacture of heavy duty D.C. switchgear. He should have scientific and commercial qualifications as well as practical experience, originality and initiative. He would have unlimited opportunity for developing his ability at a good salary rising without limit according to his performance. To the right man the future prospects are bright.—Box 62.

DEVELOPMENT designers and draughtsmen required by the Plessey Company Limited. Applicants would be required to undertake the design of tools and equipment, including plastic and die casting tools and the subsequent development to production stage of small electromechanical devices. The posts are permanent and offer variety and interest. Write, stating age, experience and salary required, to—Mr. C. D. H. Webb, General Personal Manager, Breeze Electrical Division, Plessey Company Limited, Ilford, Essex. 2415

DEVELOPMENT draughtsman required, experienced in sheet metal fabrication and castings of all types. Capable of building up drawings from design sketch to finished state. Age 22/25 years. Large modern factory. Five-day week. Canteen and transport facilities. Apply in writing, giving full details of experience, to—Personnel Manager, Simplex Electric Company Ltd., Grindley Lane, Blythe Bridge, Stoke-on-Trent, Staffs. 1714

DRAUGHTSMEN and engineer-designers required for traction control gear. Men having good mechanical experience would be considered. Good remuneration for men of first-class experience. Apply, quoting "Switchgear," to—Staff Manager, The General Electric Co, Ltd., Witton, Birmingham, 6. 2236

DRAUGHTSMEN required by Midlands firm manufacturing E.H.T. air-break switchgear and H.T. and L.T. oil-immersed metalclad switchgear. Men having experience in any of these classes of gear should apply in writing, giving details of age, experience, qualifications and salary required, to—Box 199.

DRAUGHTSMEN required for designs department of electrical engineering company, Manchester. Applicants should have had practical engineering experience and some drawing office training. Replies giving age and full particulars of previous experience, education and technical standard attained, to—Box 2386.

DRAUGHTSMEN required for work of high national importance. Experienced in the design of light electro-mechanical apparatus. Apply (quoting ref. STK), Personnel Department, The General Electric Co. Ltd., Union Works, East Lane, Wembley, Middlesex. 2289

DRAUGHTSMEN with sound electrical engineering experience (all classes), required for extremely interesting work in our Bath offices. Above A.E.S.D. rates to experienced applicants. Lodgings available for single men.—Box 2276

ELECTRICAL and mechanical engineers and metallurgists are required for experimental work at the research laboratories of the General Electric Co. Ltd., East Lane, North Wembley, Middlesex. Graduate staff are needed for work on radio-communications, domestic heating appliances, illumination, light mechanical engineering problems and in the metallurgical field. Applications, giving age and record, should be sent to the Staff Manager (Ref. GBLC/430). 2393

ELECTRICAL assistant required for measurements on cables in inspection and test department of a telecommunications cable factory in S.E. London. Qualifications: National Certificate or equivalent. Suitable age 19-30. Salary according to age and experience. Applications, giving qualifications and training, to be addressed to—Box 2336.

ELECTRICAL draughtsmen wanted for long-term oil refinery and chemical plant programme. Five-day week, pension and insurance plan. Write, stating experience and salary required, to—Chief Engineer, E. B. Badger & Sons (G.B.) Ltd., 40, Parkgate Road, Battersea, London, S.W.11. 2065

ELECTRICAL buyer for large firm of electrical contractors. Commencing salary £10 per week. Write full particulars of age and previous experience to—Box 2410.

ELECTRICAL draughtsmen are required by a well-known engineering company in the North-West. Good canteen and first-class working conditions with excellent sports and social facilities. Five-day week. Assistance will be given to successful applicants to find living accommodation. Write, stating age, qualifications and experience, mentioning ref. ACE, to—Box 2207.

ELECTRICAL draughtsmen required for the electrical section of the drawing office of a large steelworks in North-West England. Applicants must have had experience in the layout of heavy power distribution system and have a background of practical experience in electrical engineering. Applications, giving full details of experience and qualifications, and stating age and salary required, should be submitted to—Box 2127.

ELECTRICAL engineer with 3-5 years post graduate experience is required for the design of special types of small motors and generators to form part of a complete electro-mechanised system. Applications in writing to be sent to—The Staff Manager (Ref. GBLC/440), Research Laboratories of The General Electric Co. Ltd., East Lane, North Wembley, Middlesex, stating qualifications, age and experience. 2425

ELECTRICAL engineer, 25-35, married or single, required for public utility Georgetown, British Guiana, to supervise distribution, metering 16,000 consumers and electric plant aggregating 12,500 kW. Three years' engagement. Salary 400 British Guiana dollars per month. Further particulars from and applications to—Box 2259.

ELECTRICAL engineers required as permanent outworkers for both home and overseas contracts. Erecting and commissioning of all types of power station and industrial installations, comprising switchgear, transformers, rectifiers, large electrical machines, turbo-alternators and electronic devices. Qualifications, technical: at least Higher National Certificate; practical: recognised engineering apprenticeship. Salary according to qualifications and experience. Apply Construction Dept., The British Thomson-Houston Co. Ltd., Rugby. 2402

ELECTRICAL fitters required as permanent outworkers for erection of all types of power station and industrial installations, comprising switchgear, transformers, rectifiers, large electrical machines and turbo-alternators. Apply Construction Dept., The British Thomson-Houston Co. Ltd., Rugby. 2403

ELECTRICAL-mechanical engineer required by large industrial concern. Applicant must hold H.N.C. or equivalent, skilled in erection of H.T. and L.T. synchronous motors, transformers, switchgear, and capable of running large workshop handling constructional work, switchgear, distribution fuse cubicles, A.C. and D.C. windings and major repairs. Practical knowledge of H.T. and L.T. cable winding advantageous. Duties would include making periodical inspections of power and lighting installations in Britain and Eire. Details of experience, salary required and copy of recent testimonials to—Box 2401.

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ELECTRICIANS with general contractors' experience; local work; permanent position offered to good men. Apply — Knight's (Hendon) Ltd., 42, Watford Way, N.W.4. 133

ENGINEER capable of estimating for contracts. Rendering government accounts, handling general office routine, for an electrical contractor.—Box 9945.

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ESTIMATING engineer capable of dealing with complete motor control schemes. Reply, stating age, experience and salary required, to—Switchgear Estimating, General Electric Co., Witton, Birmingham, 6. 2237

ESTIMATOR assistant required by electrical engineers and contractors, Midland area. Experience with Government contracts preferred. State experience and wage required.—Box 2279.

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FUSEGEAR sales and contracts engineers. Immediate openings are available in a modern electrical appliance works in Liverpool for candidates with Higher National Certificate in electrical engineering and who have some drawing office experience. A knowledge of tendering and contract work is desirable; but if necessary, applicants with suitable background will be trained. The positions are permanent and pensionable. Please write, stating age, experience and qualifications, and quoting ref. DDC, to—Box 2326.

GENERAL manager required by a company manufacturing electric control gear and domestic electrical apparatus. Apply in writing to—De Renzi Holmes & Co. Ltd., Fox's Lane, Wolverhampton. 2260

JOINTERS' mates required immediately. Must be willing to travel. London rate of pay and out allowance. Write, stating age and experience, to—Box 9933.

JOURNEYMAN plumber-jointers required immediately. London rate of pay and out allowance. Write, stating age and experience, to—Box 9932.

JUNIOR draughtsmen required aged 21 to 25 years, preferably some experience overhead line switchgear —Line Equipment Ltd., Bridgend. 9944

JUNIOR electrical engineer required by consulting engineers in Victoria district. Must have had some experience in the preparation of power and lighting installation schemes for hospitals, schools, factories, etc. Excellent prospects for suitable applicant. Apply to Box 2347, stating age, experience, qualifications and salary required.

LADY secretary required for Wembley branch, preferably with experience of electrical trade. Shorthand and typewriting essential. Write, stating age and experience to—Staff Director, The Sun Electrical Co. Ltd., 118/124, Charing Cross Rd., London, W.C.2. 2418

LEADING designer electrical fittings requires personal assistant. Knowledge working drawings essential. Age 30-40. Salary according to qualifications.—Box P.P. 33777, Samson Clarks, 57-61, Mortimer Street, London, W.1. 2353

MANUFACTURING electrical engineering company require experienced foreman, with previous experience of light coil winding, for small coil winding shop. Apply —Box 2432.

MERZ & McLELLAN have a vacancy at their Esher office for an electrical engineer capable of preparing specifications and analysing tenders and dealing with engineering problems associated with power station layouts and all electrical equipment associated therewith, including switchgear up to 33 kV. Applicants should be qualified engineers who have preferably obtained an engineering degree, completed at least two years' apprenticeship, and had manufacturing experience. Salary will depend upon age and experience. Applicants should apply to Merz & McLellan, Milburn, Esher, stating age, salary required, education, qualifications and details of training and experience. 2367

METHODS engineers required to investigate shop problems and to initiate new methods and processes in connection with manufacture of high-voltage switchgear. Applicants must have a wide practical experience and possess technical qualifications of H.N.C. standard or its equivalent. Very good prospects. Write, stating full details of previous experience, etc., and salary required, quoting ref. IJC, to—Box 2364.

METHODS engineers required to investigate works layout and to carry through reorganisation and works layout projects in connection with the manufacture of high-voltage switchgear. Applicants must have a wide practical background with administrative experience, knowledge of modern methods, and possess technical qualifications to H.N.C. standard. Write, stating full details of experience, etc., and salary required, quoting ref. IJD, to—Box 2365.

PHYSICS: Young male graduate required for research and development of insulating materials, Leyton area. Progressive post for right man.—Box 2368.

POST-graduate apprenticeships: Applications are invited from men with a university degree or technical college diploma for two-year course of training with electrical engineering company manufacturing high and medium voltage switchgear. Suitable posts will be available at the completion of training. Special consideration will be given to those who have completed their period of national service. Give full particulars to—Box 2355.

OVERHEAD line engineers required by consulting engineers for work in North Scotland. Experience in the construction of H.V. and L.V. distribution networks essential. Apply, in writing, to—Kennedy & Donkin, 32, Alva Street, Edinburgh, 2. 2421

POWER plant charge engineer required by major oil company for employment in the Middle East to operate a combined gas and steam turbine station where he will take charge of a shift. Applicants, who should be under 30 years of age, must possess a Higher National Certificate in electrical engineering and have served an apprenticeship in the generation division of a power supply organisation undertaking power station control room operation, followed by experience as a boiler house or turbine room charge engineer. Attractive salary plus generous allowance in local currency designed to assist substantially in meeting cost of living, free passages, kit allowance, free medical attention, good leave arrangements, pension scheme. Write, stating personal particulars and details of qualifications and experience, quoting Dept. F.13/F. to —Box 3926, at 191, Gresham House, London, E.C.2. 2210

PROCESS control and inspection: Young man of good education with some electrical and mechanical knowledge for training as process control officer. Good opportunity for keen man.—Box 2369.

QUALIFIED senior assistants to consulting electrical engineer required. Fully conversant with design and supervision of electrical and lift installations in industrial, commercial and domestic premises. Details to—T. P. Bennett & Son, 43, Bloomsbury Sq., London, W.C.1. 2239

RATEFIXER required. Light electrical engineering. Must be fully experienced. Write (quoting ref. STK). Personnel Department, The General Electric Co. Ltd., Union Works, East Lane, Wembley, Middlesex. 2290

REPRESENTATIVE required by London electrical wholesalers. Connection with industrial users in Greater London area essential.—Box 1953.

SECRETARY/Shorthand typist required for London office of leading electrical manufacturers in Victoria area. Full details, including age, experience, salary required, to—Box 2111.

SENIOR switchgear designer required with experience of indoor and outdoor oil break equipment, 33 kV upwards. Applicants will be required to take responsibility for designs up to the production stage. The position offers good prospects to the right man. Minimum qualifications: Graduate or corporate membership of the I.E.E. House available to married man; superannuation scheme; modern factory. Applications, giving full details of experience and technical education, to—The Personnel Manager, South Wales Switchgear Limited, Blackwood, Mon. 2371

SEVERAL vacancies exist in the development laboratory of the General Electric Co. Ltd., Witton, for development engineers in the electronics, small motor, engineering and protective gear sections. Applicants should preferably possess a degree or higher national certificate in electrical engineering, but those taking their final examination this year will also be considered. Salaries will depend upon qualifications, age and experience. Apply in writing, giving full particulars and quoting 'Development Laboratory,' to—Staff Manager, General Electric Co. Ltd., Witton, Birmingham, 6. 2302

SHIFT charge engineers (distribution) are required by the Steel Company of Wales Ltd. to take charge of all switching operations on its E.H.T. and L.T. distribution systems in Abbey, Margam and Port Talbot works under normal and emergency conditions. Peak load on system amounts to 90 MW, partly generated at company's power station. Candidates must be experienced in large-scale switching operations and fully conversant with protective equipment and control circuits. Industrial experience is an advantage. Applications, stating age, education, training, qualifications and experience, should be submitted in writing to—The Personnel Superintendent, The Steel Company of Wales Ltd., P.O. Box No. 3, Port Talbot. 2224

STOCK control clerk (male) required for electrical contractors in Knightsbridge district. Write, giving full particulars of experience, age and salary required, to—Box E.520, Willings, 362, Gray's Inn Road, London, W.C.1. 2323

SURVEYOR required for lengthy Government H.T., L.V. pole line and cable contracts, North of England and Scotland. State qualifications and salary expected. House available to suitable applicant.—Box 791, Robertson & Scott, Edinburgh, 2. 2417

TELECOMMUNICATIONS engineer, aged 25 to 35, with degree, and preferably having previous experience, required for investigational work on telephone cables. Apply—Personnel Officer, Southern United Telephone Cables Ltd., Dagenham Dock, Essex. 2131

THE BRUSH ELECTRICAL ENGINEERING Co. Ltd. has a vacancy for a design engineer conversant with A.C. and D.C. motor control gear. Good experience of practical design and development on industrial or traction equipment is essential, with ability to initiate new designs. A designer-draughtsman is also required to deal with similar work. Excellent opportunities for advancement are available. Write, with full details of age, experience and salary required, to—The Technical Director, The Brush Electrical Engineering Co. Ltd., Loughborough, Leics. 1788

THE STEEL COMPANY OF WALES Ltd. still has a number of vacancies for electrical foremen (maintenance) at its Abbey, Margam and Port Talbot works. Apprenticeship and experience on maintenance of heavy industrial plant (preferably steelworks) is essential. Applications, giving full particulars of training and experience, should be addressed to—The Personnel Superintendent, The Steel Company of Wales Ltd., P.O. Box No. 3, Port Talbot. 2381

TRANSFORMER test engineer, with practical experience required. Good salary and prospects. Apply, stating age, experience and qualifications to—Managing Director of Brentford Transformers Ltd., Kewbrooke Park Road, S.E.3. Tel. Lee Green 1006/8. 2416

WANTED, junior contracts engineer, preferably with drawing office experience. Excellent prospects, good salary. Apply—Edmundsons Electric Co. Ltd., 24/30, Gillingham Street, London, S.W.1. 2236

WIREMAN, experienced in G.P.O. methods, able to work from schematic drawings. Knowledge of amplifier wiring and advantage. Salary according to experience. Apply, in writing, giving details age and experience to—RCA Photophone Ltd., "The Tower," Brook Green Road, Hammersmith, W.6. 2409

YOUNG electrical engineer required (minimum standard Higher National Certificate) by glass machinery engineering company. Excellent opportunity for man who is prepared to expand his interests outside field of electrical engineering. Commencing salary according to industrial experience in electrical engineering; minimum £425 per annum, with increases on completion of further training. Apply, Secretary, British Hartford-Fairmont Syndicate Ltd., Rockware Avenue, Greenford, Middlesex (Waxlow 1141). 2331

YOUNG lady required with general office experience, to include some typing, and knowledge of telephone switchboard. Write, stating age and experience to—Staff Director, The Sun Electrical Co. Ltd., 118/124, Charing Cross Rd., W.C.2. 2419

YOUNG qualified electrical engineer required for maintenance in North-East Coast blast furnace plant, generating own power. Applications, stating age, experience and technical qualifications, to—Box 2113.

APPOINTMENTS FILLED

Dissatisfaction having so often been expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

BOX 1417—"Electrical Engineer." All applicants are thanked.

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AGED 30, single, seeking change of responsible position in contracting admin.; wide experience in handling staff. Able to take charge of estimating, costing, preparation of accounts, or good-class showroom. Willing to take suitable post at home or overseas.—Box 9923.

CHIEF engineer, designer draughtsman, A.M.I.E.E. (40), with works and production experience, motors, generators, switchgear, gearing. Some electronic knowledge. Adaptable.—Box 9925.

DURHAM undergraduate, final year electrical engineering, some practical experience, seeks position as technical representative with a view to permanency after graduating.—Box 9938.

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ELECTRICAL engineer, M.A.S.E.E., manager electrical contractors, experienced estimator all types installations, desires position where keenness and initiative will be appreciated. Age 29. Salary £620 p.a. Birmingham area.—Box 9899.

ELECTRICAL staff foreman, age 32, fully experienced in all branches of contracting, seeks position with prospects in London area.—Box 9878.

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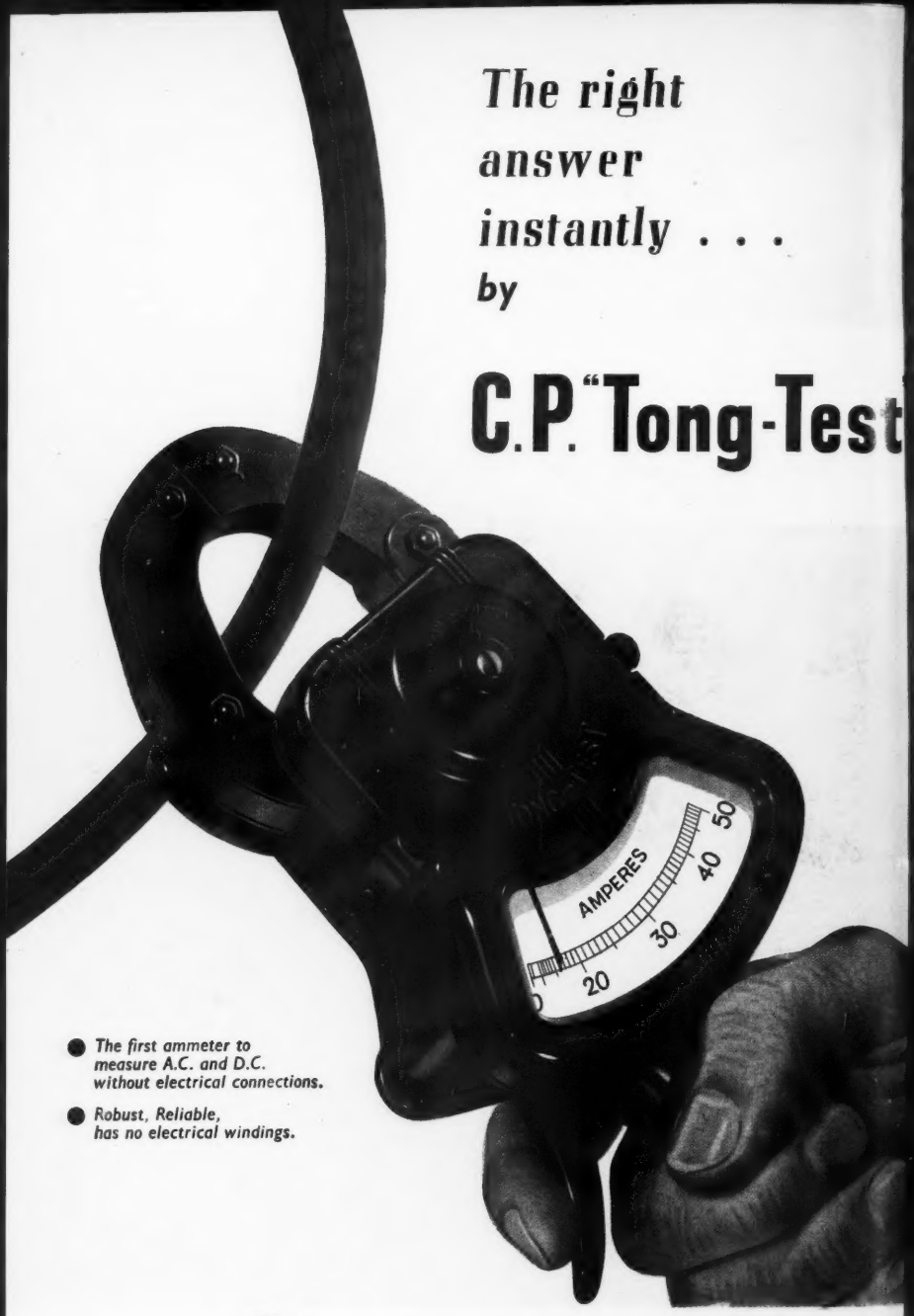

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